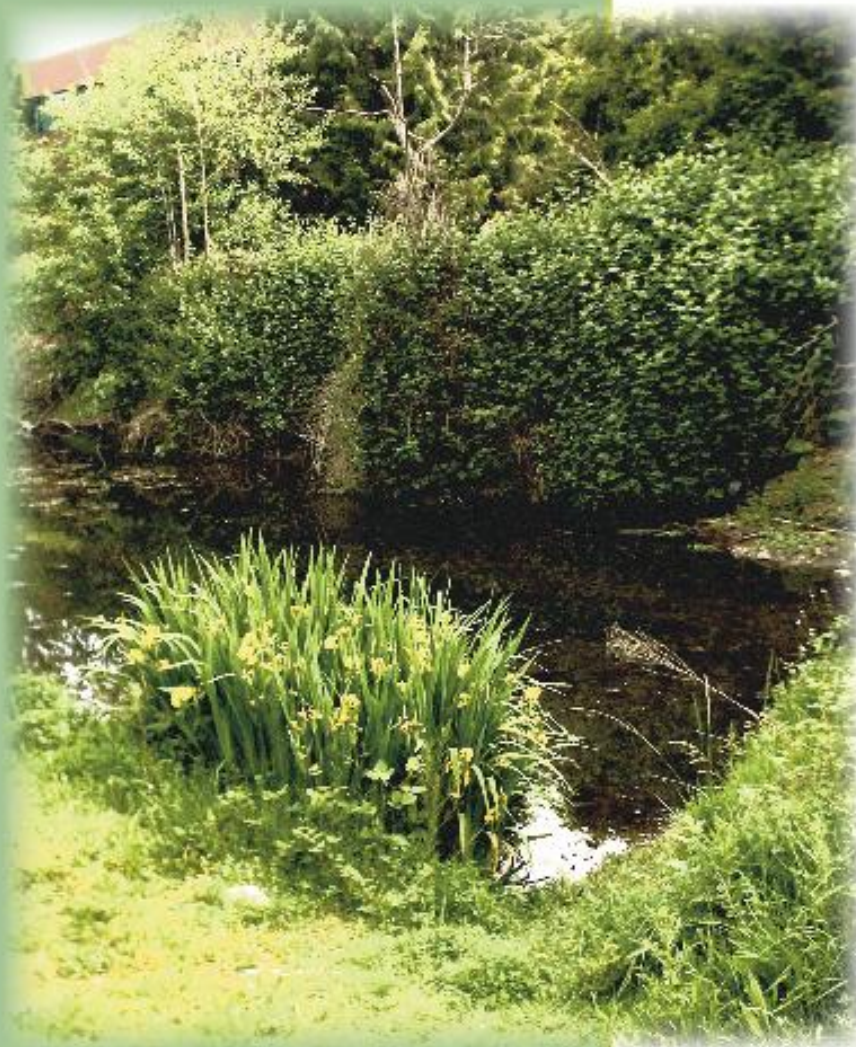


# STORMWATER ANNUAL REPORT

*for the* **CITY OF EUGENE, OREGON**



*Permit Year Four July 1, 2006–June 30, 2007*

Submitted by: **City of Eugene**

Submitted to: **Oregon Department of Environmental Quality**

**December 1, 2007**

National Pollution Discharge Elimination System  
(NPDES) Permit 101244





# **Fourth Annual Report**

**Status Report for Permit Year Four  
(July 1, 2006 – June 30, 2007)**

**Submitted to:**  
Oregon Department of Environmental Quality

**Submitted by:**  
City of Eugene

Submitted in Accordance with the  
Requirements of National Pollutant  
Discharge Elimination System (NPDES) Permit  
Number 101244, File Number 107989

December 1, 2007

**CITY OF EUGENE, OREGON**  
**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)**  
**MUNICIPAL STORMWATER SYSTEM ANNUAL REPORT**

The City hereby submits this National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater System Fourth Annual Report and Stormwater Management Plan Evaluation in accordance with NPDES Permit Number 101244, File Number 107989. We certify under penalty of law that this document and all attachments were prepared under our direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

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# **1 INTRODUCTION**

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Discharges from Eugene's municipal stormwater system into waters of the state are regulated by the Oregon Department of Environmental Quality under the National Pollution Discharge Elimination System (NPDES) permitting program. The City of Eugene received its first NPDES municipal separate storm sewer system (MS4) permit in November 1994. DEQ issued Eugene its second NPDES stormwater permit in March 2004. Under each permit, annual reporting is a required element. The 2004 permit includes additional evaluation and reporting requirements which were addressed in the Second Annual Report and submitted to the DEQ December 1, 2005.

This section of the report includes background information and a history of Eugene's stormwater NPDES permit (Section 1.1), a summary of relevant conditions from the City's 2004 NPDES permit (Section 1.2) and an overview of the contents of this report (Section 1.3).

## **1.1 Background and Eugene's NPDES Permit History**

The National Pollution Discharge Elimination System (NPDES) permitting program is authorized by Section 402 of the Clean Water Act. In Oregon, the NPDES program is administered by the Department of Environmental Quality. Discharge of industrial wastewater, municipal wastewater, and stormwater into waters of the United States are all regulated through the NPDES program. For stormwater, NPDES permits are issued for discharges from municipal separate stormwater sewer systems (MS4s). Eugene is an MS4 and operates its stormwater system under a MS4 permit.

In 1990, the U.S. Environmental Protection Agency (EPA) published its Phase I regulations governing stormwater discharges under the NPDES program of the Clean Water Act. Phase I regulations required that municipalities with a population of 100,000 or more obtain a NPDES permit for their stormwater discharges to waters of the state. Subsequently, the City of Eugene applied for an NPDES permit for stormwater discharges within the City of Eugene. Part one of the original application was submitted to the DEQ in May 1992. Part two of the original application was submitted in May 1993 and included a Stormwater Management Plan (SWMP), describing the agency's plan for reducing the discharge of pollutants to the "maximum extent practicable." A SWMP is comprised of a set of best management practices, or BMPs, and a Monitoring Plan. Eugene's Stormwater Management Plan was approved by the Department of Environmental Quality (DEQ) and incorporated into the NPDES permit which was then issued on November 10, 1994.

Eugene's first NPDES stormwater permit expired on September 30, 1999. The City applied for renewal of the NPDES permit in March 1999 and submitted a revised Stormwater Management Plan in March 2000. The permit was administratively extended by DEQ and the City continued implementation of the program described in the original Stormwater Management Plan. DEQ issued the City of Eugene a new permit in March 2004, which incorporated by reference the revised 2000 Stormwater Management Plan. The City's First Annual Report under the new permit was submitted to DEQ on December 1, 2004. The City's Second Annual Report under

the new permit was submitted to DEQ on December 1, 2005. In response to conditions in the 2004 permit, the City's Second Annual Report included a summary of its evaluation of the City's SWMP and some proposed modifications to meet the new permit conditions. DEQ in a letter dated November 2, 2006 indicated that the Second Annual Report satisfied all the requirements of the permit. DEQ indicated in conversation that the City could move forward with implementing revisions to its SWMP as proposed in the Second Annual Report.

The City of Eugene submitted its Third Annual Report under the City's 2004 permit to DEQ on November 31, 2006. DEQ in a letter dated May 4, 2007 indicated satisfaction with the content of the report.

This document is the Fourth Annual Report under the City's 2004 permit.



## **1.2 NPDES Permit Conditions**

Eugene's NPDES stormwater permit, attached as Appendix F, consists of Schedule A, B and D, and a set of General Conditions. The permit conditions most relevant to this report are as follows:

Schedule A lists stormwater discharge and control limitations. Specifically the City of Eugene must:

- Implement all applicable provisions in the currently approved Stormwater Management Plan (SWMP).
- Reduce the discharge of the pollutants from the municipal stormwater system to the "maximum extent practicable."
- Effectively prohibit non-stormwater discharges into the municipal stormwater system unless such discharges are otherwise permitted by an existing NPDES permit.

Schedule B outlines the monitoring and reporting requirements. An annual report is required to be submitted to DEQ each year by December 1<sup>st</sup>. Additional reporting requirements are included for the Second Annual Report and for the permit renewal application.

Schedule D outlines Special Conditions, including:

- The City must maintain adequate legal authority to effectively implement and enforce the permit conditions.
- The City's SWMP must include a public involvement component.

The last section of the permit is the General Conditions section which includes specific procedures for managing data and records, definitions of terms, and penalties for violations of the permit.

## **1.3 Report Contents**

This report provides information on the progress of the permit activities from July 1, 2006 through June 30, 2007 herein referred to as Permit Year 4. It includes: this Introduction (Section 1), Overall Program Management (Section 2), Status of Implementation (Section 3), and Monitoring Program (Section 4).

As required by The Department of Environmental Quality, this report fulfills Item 2(a) of Schedule B of NPDES permit number 101244, file number 107989, issued March 2, 2004.

## 2 OVERALL PROGRAM MANAGEMENT

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This section of the report provides information about how Eugene's stormwater program is managed (Section 2.1), the relationship between the City's NPDES permit and its stormwater policy guiding document, the Comprehensive Stormwater Management Plan (Section 2.2), and the relationship of the City's NPDES permit and stormwater program to other local jurisdictions, the City of Springfield and Lane County (Section 2.3).

### 2.1 Program Structure

The Eugene Public Works Department has overall responsibility to implement the elements of the Stormwater Management Plan (SWMP). The SWMP elements are managed by five divisions in the department: Administration, Engineering, Maintenance, Parks & Open Space, and Wastewater. The Eugene Planning & Development Department has responsibility for two elements as indicated in the table below. General areas of responsibilities are as shown in the following table:

Public Works Administration Division	Stormwater education Graphics and publications support Fact sheets and public outreach Financial management
Public Works Engineering Division	Standards for new development Erosion control Basin plan implementation Storm system mapping & data management
Public Works Maintenance Division	Illicit connections/Illegal discharges Spill response Street sweeping Litter pick up Constructed system maintenance practices Maintenance management system
Public Works Parks & Open Space Division	Open channel maintenance practices Vegetation management Volunteer programs Tree planting program
Public Works Wastewater Division	NPDES permit program administration Water quality monitoring, sampling, and analysis Water quality data management Stormwater planning
Planning and Development Department	Recycling and waste prevention education Yard debris recovery program

Coordination of the various activities occurs through routine staff communication, and via several staff teams:

Stormwater Policy Team	Provides policy direction for the Stormwater Program.
Stormwater Management Team	Provides overall management for Stormwater Program. Oversees development of new policy for approval by Policy Team. Implements Policy Team direction.
Stormwater Operations Team	Shares information for on-going program coordination. Resource pool of key staff for specific tasks.
Stormwater Enforcement Coordination Team	Coordinates on code compliance incidents. Shares information on enforcement actions.
Stormwater Penalty Review Team	Reviews administrative civil penalties and makes determination. Provides inter-divisional coordination.

## 2.2 Relationship to Comprehensive Stormwater Management Plan (CSWMP)

In 1993, the Eugene City Council adopted as a refinement to the Eugene-Springfield Metro Plan, the Comprehensive Stormwater Management Plan (CSWMP) which provides the policy framework for the City's stormwater program. The impetus for adopting CSWMP was in part the federal requirements of the NPDES permit, but it was also necessitated by concerns over open waterway management and the discovery, in the early 1990's, of an extensive concentration of wetlands in west Eugene. A major goal of adopting CSWMP was to address a variety of stormwater issues within a comprehensive management framework -- to manage each of the program areas so that they are coordinated and consistent, meet the requirements of federal law, meet the needs of the community, and meet multiple objectives. The CSWMP primary program areas are:

- **Flood control** efforts are to be modified to maintain current levels of service while improving water quality and protecting natural resources.
- **Water quality** efforts are to be employed to reduce the discharge of pollutants to the maximum extent practicable.
- **Natural resources** that are related to the stormwater drainage and flood control system, such as conveyance corridors and adjoining wetland and riparian zones, are to be managed to benefit water quality and wildlife habitat.
- **Operations and maintenance** practices are to be modified to meet the objectives of flood control, water quality improvement, and related natural resources protection.

The adopted CSWMP incorporates the City's NPDES permit Stormwater Management Plan best management practices (BMPs), as well as other implementation measures to achieve CSWMP goals and objectives. Many of the NPDES-related BMPs overlap with other CSWMP objectives such as the use of native plants along water corridors for bio-filtration purposes and for wildlife habitat, and the use of retention basins for both water quality treatment and flood control.

As part of a stormwater program review in 2002, the Eugene Public Works Stormwater Policy Team reviewed CSWMP and concluded that it still represents the appropriate policy basis for Eugene's stormwater program.

### **2.3 Relationship to Other Local Jurisdictions**

Lane County and the City of Springfield have been identified by the DEQ for permitting under Phase II of the NPDES permitting program. Each agency was issued a Phase II stormwater NPDES permit on January 25, 2007. In anticipation of obtaining their Phase II stormwater permit, and for the mutual benefit of both agencies, Lane County and Eugene entered into an intergovernmental agreement in April 2004 to collaborate on stormwater program activities in the jurisdictional area outside of city limits and within the Eugene urban growth boundary. One of the specific items in the agreement is a collaborative effort by Eugene and Lane County to complete the River Road – Santa Clara Stormwater Basin Plan (see BMP E1). Eugene, Springfield, and Lane County regularly and often collaborate on stormwater education activities such as generating educational brochures, and on metro-wide planning efforts with relationship to water quality.

### **3 STATUS OF IMPLEMENTATION**

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This section provides: an explanation of SWMP best management practices (BMP) coding and general BMP categories (Section 3.1); a summary of financial expenditures over the reporting year and projections for the following reporting year (Section 3.2); assurances of continued legal authority (Section 3.3); and a status report on the implementation of each BMP (Section 3.4). Table 3-1 following Section 3.1.7 includes the full list of BMPs by code number.

#### **3.1 NPDES Stormwater Management Plan BMP Categories**

Eugene's NPDES Stormwater Management Plan includes 23 best management practices (BMPs) designed to reduce the discharge of stormwater pollutants to the maximum extent practicable. Each BMP is given a code (for example, A1) for tracking and reporting purposes; the coding is based on the division within the Public Works Department or Planning & Development Department that has lead responsibility, as follows:

A = Administration Division of Public Works  
B = Building Division of Planning and Development  
E = Engineering Division of Public Works  
M = Maintenance Division of Public Works  
P = Parks and Open Space Division of Public Works  
W = Wastewater Division of Public Works

The 23 BMPs fall into seven general categories: Public Education; Planning, Capital Improvements, and Data Management; Construction Site Management and Design Standards for New Development; Operations and Maintenance; Illicit Discharge Controls; Waste Management; and Industrial Controls.

##### **3.1.1 Public Education**

The purpose of public education BMPs is to inform the public, the commercial/industrial sector, and in-house personnel about the sources and causes of stormwater pollution, its effect on the local receiving waters, and to encourage active involvement (e.g. behavioral changes, volunteerism, etc.) in the effort to reduce pollution.

- A1 Best Management Practices for Businesses
- A2 Stormwater Education
- P1 Educational Volunteer Activities

##### **3.1.2 Planning, Capital Improvements, and Data Management**

The purpose of planning, capital improvements and data management is to develop and implement comprehensive stormwater basin plans, evaluate potential sources of specific pollutants and related BMPs to address them, evaluate the impact of city activities on water quality, maintain up to date data on the stormwater system, and coordinate system information between departments and agencies for multiple applications.

- E1 Stormwater Basin Master Plans
- E3 Stormwater System Mapping and Data Management
- W1 Address Impact of City Activities on Water Quality
- W3 Bacteria Pilot Study

### **3.1.3 Construction Site Management and New Development Standards**

The purpose of the construction site management and design standards for new development BMPs is to ensure that appropriate control measures are considered, implemented, and maintained during and after the planning, design, and construction phases for new public and private development and significant re-development projects.

- E2 Erosion Prevention and Construction Site Management Program
- E4 Stormwater Development Standards

### **3.1.4 Operations and Maintenance**

The purpose of operations and maintenance BMPs is to maintain the publicly managed stormwater system (e.g. pipes, culverts, open waterways, water quality facilities), balancing flood control, drainage services, water quality, and natural resource protection needs, and to adaptively manage for continuous improvement of current operations and maintenance practices. Operations and maintenance BMPs are also focused on planning and performing other City services, such as landscape maintenance or road repair projects for example, in a manner that minimizes the potential for stormwater pollution from these activities.

- M4 Prevent Leaks and Spills from Municipal Vehicles and Equipment
- M5 Public Stormwater System Cleaning Programs
- M6 Street Sweeping Program
- M8 Winter Road Sanding and De-Icing Program
- P2 Revise Comprehensive O&M Plans
- P3 Tree Planting and Urban Forest Enhancement
- P4 Public Landscape and Vegetation Management Program

### **3.1.5 Illicit Discharge Controls**

The purpose of illicit discharge BMPs is to become aware of, investigate, detect, mitigate, and enforce the elimination of illicit (non-stormwater) discharges and illegal dumping to the stormwater system.

- M1 Enforcement for Illicit Discharges
- M2 Environmental Spill Response Team
- M3 Litter and Illegal Dumping Programs
- M7 Systematic Field Investigation for Improper Discharges

### **3.1.6 Waste Management**

The purpose of the waste management BMPs is to educate the public, regulate waste management services, and to ensure proper facilities are available in order to minimize the potential of negative stormwater impacts from solid waste collection, improper disposal of toxic materials, and illegal dumping of garbage and debris.

- B1 Household Hazardous Waste Disposal
- B2 Solid Waste Management

### **3.1.7 Industrial Controls**

The purpose of industrial controls is to provide oversight of stormwater discharges from industrial facilities, including screening, inspections, technical assistance, and response to spills at permitted facilities.

W2 Industrial Stormwater Management Program

**Table 3-1**  
**Stormwater Best Management Practices**

<b>2004 BMP#</b>	<b>BMP Title</b>
<b>A1</b>	Best Management Practices for Businesses
<b>A2</b>	Stormwater Education
<b>E1</b>	Stormwater Basin Master Plans
<b>E2</b>	Erosion Prevention & Construction Site Management Program
<b>E3</b>	Stormwater system Mapping and Data Management
<b>E4</b>	Stormwater Development Standards
<b>M1</b>	Enforcement for Illicit Discharges
<b>M2</b>	Environmental Spill Response Team
<b>M3</b>	Litter & Illegal Dumping Programs
<b>M4</b>	Prevent Leaks and Spills from Municipal Vehicles and Equipment
<b>M5</b>	Public Stormwater System Cleaning Programs
<b>M6</b>	Street Sweeping Program
<b>M7</b>	Systematic Field Investigation for Improper Discharges
<b>M8</b>	Winter Road Sanding and De-Icing Program
<b>P1</b>	Educational Volunteer Activities
<b>P2</b>	Revise Comprehensive O&M Plans
<b>P3</b>	Tree Planting and Urban Forest Enhancement
<b>P4</b>	Public Landscape and Vegetation Management
<b>B1</b>	Household Hazardous Waste Disposal
<b>B2</b>	Solid Waste Management
<b>W1</b>	Address Impact of City Activities on Water Quality
<b>W2</b>	Industrial Stormwater Management Program
<b>W3</b>	Bacteria Pilot Study



## **3.2 Financial Summary**

### **3.2.1 Actual Expenditures – Permit Year 4**

Stormwater program activities are funded by a combination of public and private financing: Stormwater User Fees, Stormwater Systems Development Charges; Assessments; State and Federal Funds; Volunteer Services; and Partnerships (Youth Corps/Bureau of Land Management/The Nature Conservancy).

The two primary on-going funding sources for stormwater program activities are:

- Stormwater User Fees. User fees are paid for by all existing and new residents and businesses. User fees are impervious surface area-based and are reduced if the site is not connected to the public system. Stormwater user fees fund on-going operations and maintenance (including street sweeping, catch basin cleaning, litter pick-up, spill response, stormwater education and volunteer activities) and new capital (including major system rehabilitation projects, retrofits of the existing system to address water quality, wetland and waterway restoration projects, and new stormwater facilities such as pipes, culverts, constructed wetlands, ponds, and filters).
- Stormwater System's Development Charges (SDCs). SDCs are paid for by new and expanding development. The fees are based on impervious surface area, number of dwelling units, or footprint. SDC's typically fund construction or expansion of large pipes, drainage ways, catch basins and culverts.

The stormwater program-wide actual expenditures over the year reporting period for Permit Year 4 are shown in Table 3-2. Permit Year 4 corresponds with the City's Fiscal Year 2007. Actual expenditures reported include funding for NPDES permit related activities and for stormwater program activities which are outside of the NPDES permit, such as: system maintenance for conveyance and flood control and wetland program management.

**Table 3-2  
Actual Expenditures for Permit Year Four**

**City of Eugene  
Public Works Department - Stormwater Funds (335, 531, 535)  
FY07 - July 1, 2006 thru June 30, 2007  
October 1, 2007**

ORG Description	(All)	
		FY07 Actuals July 1, 2006 thru June 30, 2007
<b>Actual</b>		
<b>Fund</b>	<b>Division</b>	<b>2007</b>
<b>335 Stormwater SDC</b>	93 - Engineering	\$1,285,130
	99 - Non Departmental	\$6,200
<b>335 Stormwater SDC</b>	<b>Total</b>	<b>\$1,291,330</b>
<b>531 Stormwater Utility - Capital</b>	89 - Administration	\$0
	93 - Engineering	\$1,543,938
	99 - Non Departmental	\$76,742
<b>531 Stormwater Utility - Capital</b>	<b>Total</b>	<b>\$1,620,680</b>
<b>535 Stormwater Utility - Operation</b>		
	87 – WWTP	\$616,523
	89 - Administration	\$1,032,085
	93 - Engineering	\$1,229,376
	94 - Maintenance	\$3,039,545
	96 - POS	\$2,887,775
	99 - Non Departmental	\$428,650
<b>535 Stormwater Utility - Operation</b>	<b>Total</b>	<b>\$9,233,954</b>
<b>Grand Total</b>		<b>\$12,145,965</b>

### 3.2.2 Projected Expenditures –Permit Year 5

The stormwater program budget for Permit Year 5 (City's Fiscal Year 2008) is represented by Table 3-3 and the City's adopted Capital Improvement Program. As with actual expenditures, the Year 5 budget includes funding for NPDES permit related activities and for stormwater program activities which are outside of the NPDES permit, such as: system maintenance for conveyance and flood control and wetland program management.

**Table 3-3  
Projected Expenditures for Permit Year Five**

**City of Eugene  
Public Works Department - Stormwater Funds (335, 531, 535)  
FY08 Budget - July 1, 2007 thru June 30, 2008  
October 1, 2007**

ORG Description	(All)
Account	(Multiple Items)

FY08 Budget -  
July 1, 2007 thru  
June 30, 2008

BUDGET_AMOUNT		FISCAL_YEAR
Fund	Division	2008
<b>335 Stormwater SDC</b>	93 - Engineering	\$1,098,000
	99 - CSA/Pass	
	Thru	\$19,000
<b>335 Stormwater SDC</b>	<b>Total</b>	<b>\$1,117,000</b>
<b>531 Stormwater Utility - Capital</b>	93 - Engineering	\$1,416,000
<b>531 Stormwater Utility - Capital</b>	<b>Total</b>	<b>\$1,416,000</b>
<b>535 Stormwater Utility - Operation</b>	87 - WWTP	\$822,714
	89 - Administration	\$1,034,163
	93 - Engineering	\$1,573,611
	94 - Maintenance	\$3,396,284
	96 - POS	\$3,096,085
	99 - CSA/Pass	
	Thru	\$594,203
<b>535 Stormwater Utility - Operation</b>	<b>Total</b>	<b>\$10,517,060</b>
<b>Grand Total</b>		<b>\$13,050,060</b>

### 3.3 Continued Legal Authority

Schedule D(1) requires that each NPDES permittee be able to maintain adequate legal authority, through ordinance(s), interagency agreement(s) or other means, to effectively implement and enforce the provisions of this permit. The legal authority must enable the permittee to:

- A. Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal separate storm sewer system by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity.
- B. Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer system.
- C. Control through ordinance, order or similar means the discharge to a municipal separate storm sewer system of spills, dumping or disposal of materials other than storm water.

- D. Control through interagency agreements among the future co-permittee's the contribution of pollutants from one portion of the municipal system to another portion of the municipal system.
- E. Require compliance with conditions in ordinances, permits, contracts or orders.
- F. Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer system.

In Section 2.0 of the City's original Phase I permit application (*Part I of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems, May 1992*), the City provided a detailed summary of relevant local ordinances which were in effect at the time, and thereby demonstrated that the City of Eugene had the required legal authority.

Although specific code sections referenced in 1992 may have changed, the authority required by 40 CFR 122.26 (d)(2)(i) still exists and the City has actually increased its level of authority and enforcement capabilities over time. Appendix C contains the current version of the Table of Contents for Chapter 6, "Environment" and a portion of Chapter 9, "Land Use", of the Eugene Municipal Code. Chapter 6 contains most, but not all, of the code provisions Eugene relies on to apply and enforce stormwater related regulations including those required per Schedule D(1). The Chapter 9 code provisions included in Appendix C reflect the Eugene City Council's adoption, in June 2006, of stormwater development standards. Effective July 14, 2006, as reported for BMP E4, new development within the Eugene city limits is required to address pollution reduction, flow controls (headwaters area only), source controls and oil controls.

### **3.4 Summary of Permit Year 4 BMP Activities**

This section summarizes the status of implementation of the Stormwater Management Plan in the form of accomplishments for each BMP during Permit Year 4. The historical record of accomplishments for each BMP was last reported in the Second Annual Report. With the exception of BMP W3 (Bacteria Pilot Study, initiated in permit year 3), beginning with the Permit Year 3 report, a historical record of accomplishments is no longer being provided since the information is readily available under separate cover.

#### **3.4.1 Status of Education BMPs**

##### **A1 - Best Management Practice for Businesses**

**Responsible Department/Division:**  
Public Works / Administration Division

**BMP Contact:**  
Administration Division Director

##### **BMP Description:**

Continue efforts to plan, develop and implement a comprehensive program to educate commercial and industrial businesses about best management practices that can help prevent and reduce stormwater quality impacts to the public stormwater system and local receiving waters.

##### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Collaboration with member agencies in local Pollution Prevention Coalition continues with focus on educational outreach to businesses and general public. Regionally developed Ecobiz program, which offers certification to automotive shops that follow local regulations and requirements and take advanced steps to use more sustainable businesses practices, has grown with an addition of 4 more participating businesses. Staff from multiple agencies made site visits to 4 local auto shops. Booth at Earth Day event in April 2007 highlighted Ecobiz program. Advertising about the Eco-biz program for automotive businesses includes Eugene Area Radio Stations (EARS) and Cumulus Broadcasting and print ads in the Eugene Weekly and Register Guard newspapers. Educational article about the program included in the spring issue of Stormwater Connections, a newsletter about stormwater and surface-water related issues in the community.
- Continue to provide food service brochures to COE wastewater treatment staff to send out to new businesses.
- Through Stormwater Connections Newsletter, continue to promote wet weather season for erosion prevention and construction site management program to inform and remind contractors and homeowners about maintaining site compliance for both commercial and residential building and landscaping projects from October 15 – April 30<sup>th</sup>.
- Continue research on content and format for Clean Water Business Program for landscapers. Programs for this industry are very limited. Meet with staff at local utility company to determine feasibility of combined program for water conservation and stormwater pollution prevention program for landscape businesses.
- Continue to provide brochures and educational information to enforcement staff to give to businesses with stormwater pollution violations.

- Feature article about environmental impacts of automotive fluids featured in fall issue of Stormwater Connections newsletter delivered via direct mail in Eugene area.
- Staff from education and enforcement programs with the cities of Eugene and Springfield continues to collaborate on pollution prevention programs aimed at educating businesses and residents about current issues of concern. In the formative stages is an education campaign for nurseries and other related businesses about the proper storage and cover for lawn and other yard chemicals.
- Provide stormwater educational brochures on a range of business types (food, automotive, landscaping, cleaning & maintenance) to a local catchbasin/spill clean-up business as a method of targeting specific businesses about best management practices for pollution prevention.

### **Background:**

Many businesses, be they industrial sites, commercial sites or mobile service delivery enterprises have the potential to create negative impacts to stormwater quality through both their site management and operational practices. These include but are not limited to: housekeeping practices for outdoor storage and operations areas; uncovered storage and movement of business products that are a potential pollutant source, trash and waste product site management, vehicle maintenance and washing practices, discharge and disposal practices for liquid business waste products, use of chemicals or other products outdoors, and the care and cleanliness of field operations and service delivery practices. A program to educate business owners and employees about the potential impacts to stormwater quality from their business practices and to provide them with more environmentally friendly alternatives is critical to helping eliminate business related pollutants at the source.

### **BMP Activities:**

- Research business programs offered in other communities and determine which programs could be implemented in Eugene. Where feasible, use an “environmentally friendly” business program model which recognizes businesses that contribute to improved stormwater quality through good business practices.
- Develop an educational outreach for new businesses that gives them general information about stormwater pollution and the potential impacts their business may have on stormwater quality. Provide follow-up in the form of additional educational information (brochures, fact sheets, videos) specific to their business, on-site educational visit and/or technical assistance.
- Identify existing businesses to inform and educate about stormwater pollution issues. Target specific groups through mailouts or other means of outreach.
- Conduct a business awareness effort targeted at landscape maintenance enterprises, local nurseries, University of Oregon, large corporations with their own grounds maintenance staff, property management companies, and local school districts on the proper use of pesticides, herbicides, etc.
- Include information in educational materials about the sources of problem pollutants in stormwater including lead, mercury, and bacteria, and actions private landowners and business owners can take to eliminate these pollutants from stormwater runoff.

- Include information in educational brochures and newsletters about the causes of low dissolved oxygen in receiving waters, and the actions private landowners and businesses can take to minimize depletion of stream water dissolved oxygen.
- Continue to work collaboratively with Public Works Enforcement Group to target business/industry groups most prone to pollution enforcement violations and develop specific educational outreach campaigns designed to improve pollution awareness. Outreach may include industry specific workshops, development of fact sheets, newsletters, training manuals and/or mail-outs, or media campaigns.
- In conjunction with BMP M1 (Enforcement for Improper Discharges), W2 (Industrial Monitoring Program), and E2 (Erosion Prevention and Construction Site Management Program), use investigation of illicit discharges and industrial and construction site inspections as opportunities to distribute educational materials.
- Continue participation with inter-agency pollution prevention group designed to share information and improve educational outreach to businesses and community members.

**Assessment Methods:**

- Maintain records of materials distributed, audiences targeted and number of people participating in outreach presentations/on-site educational visits.
- Request feedback on usefulness of educational materials, and obtain suggestions for future activities and materials.
- Track number of businesses participating in “clean business” programs for specific service types.

## **A2 - Stormwater Education**

**Responsible Department/Division:**  
Public Works Administration Division

**BMP Contact:**  
Administration Division Director

### **BMP Description:**

Continue to plan, develop, implement and revise as necessary a program to provide stormwater information and education to homeowners, school children, City and other agency staff as well as the general public about the impacts to stormwater quality and natural resource values from both point and non-point sources of pollution.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- New fish-friendly car wash kit program for fundraising groups began this year. Staff from Eugene & Springfield collaborated on program format, kit materials and educational outreach. Initial funding started with help of Sierra Club's Many Rivers Group. Radio advertising, television interview from local station and article in stormwater connections newsletter helped inform public. Purpose of kit, which contains sump pump, hose, electrical cord & signage, is to prevent pollutants from entering local waterways and better educate fundraising groups and citizens about the best way to divert soapy water when washing vehicles.
- Community education and outreach continues to occur through special events. These include the Good Earth Home & Garden Show (attendance estimated at 50,000), the Lane County Spring Home & Garden Show (attendance estimated at 45-50,000 ), Earth Day 2007 (estimated attendance at 2,000) and Public Works Day (estimated attendance at 1500 ).
- Information and resource sharing with participating agencies in the Pollution Prevention Coalition continues.
- Produce bi-annual newsletter, Stormwater Connections, for City-wide distribution with articles about projects, activities, and information about improving stormwater quality. Use new distribution method of direct mail to reach area residents. Mail distribution for both issues is approximately 70,500. Other distribution includes city offices, library and community facilities. The newsletter is also available on the city's website in a PDF format.
- Stormwater education continues to be taught to youth through the SPLASH curriculum at area schools. Local teachers using the SPLASH curriculum taught to 2,187 students in both Eugene school districts. A workshop for teachers in the fall provides an overview of curriculum, handouts and activities. An educational page for children, parents and teachers appears in the bi-annual newsletter, Stormwater Connections and is available on the city's website.
- Stormwater Management surveys continue to be conducted every 2years to determine changes in attitudes and opinions of city residents regarding stormwater management. Of note in the May 2007 survey is the following: Awareness of the National Flood Insurance program is at 40% compared to 32% in 2005; the SPLASH program is at 21% compared to 14% in 2005; the newsletter, Stormwater Connections, was seen by 68%, up from 56% in 2005; and the home show booth about stormwater was noticed by 26%, up from 17% in 2005



- Research what other agencies are using for stormwater education strategies that might be applied to Eugene's program.
- Continue to monitor phone calls, correspondence and e-mail.
- Keep program materials such as brochures, fact sheets, posters, school materials and booklets up to date and available to area residents.

### **Background:**

Stormwater pollution from direct and indirect sources continues to have an impact on water quality in local waterways. In particular, the connection to non-point source pollution and associated activities is not readily apparent to many. To raise awareness, offer alternative solutions and generate support for protecting our local waterways, an ongoing education program designed to reach all ages is essential. Stormwater education activities support many of the stormwater program activities by developing education and outreach materials, and providing the means to inform and involve the public in developing or changing areas of the program. (Note: educational BMPs outlined in this BMP will be coordinated with other BMPs when possible.)

### **BMP Activities:**

- Continue to improve, update and expand on educational materials such as videos, web sites, brochures, fact sheets, posters, book marks and booklets to increase awareness of pollution impacts to Eugene's water quality.
- Continue bi-annual newsletter for Citywide distribution with information on methods for improving stormwater quality.
- Develop public education programs to support activities outlined in the Comprehensive Stormwater Management Program.
- Develop on-going campaigns as appropriate to support projects, programs, special opportunities, and targeted pollutants including lead, mercury, and bacteria.
- Include information in educational brochures and newsletters about the causes of low dissolved oxygen in receiving waters, and the actions private landowners and businesses can take to minimize depletion of stream water dissolved oxygen.
- Continue to develop educational materials to support volunteer activities and natural resource protection.
- Continue promotion of SPLASH curriculum for area schools. Explore options to improve upon and expand educational outreach to teachers and students. In addition to classroom presentations and outdoor field trips, pursue other means to get students and teachers involved in hands-on learning opportunities.
- Work collaboratively with other City departments and local agencies to pool resources and continue educational outreach to local community.
- Prepare and staff booths at special events that reach community members such as the Lane County Home Show and Earth Day Celebration.
- Assist in the development of information and outreach materials related to Stormwater Development Standards (BMP E4) Basin Master Plans (BMP E1), and new Bacteria Pilot Study (BMP W3).

**Assessment Methods:**

- Track quantity of materials distributed, audiences targeted, number of people participating in events etc. Utilize records to plan future development and distribution of educational materials.
- Conduct evaluations at workshops, presentations and seminars offered. Utilize results to plan for future activities and events and to improve upon existing presentation formats.
- Conduct community surveys at 2-year intervals. Compare results to previous surveys to measure increases in level of awareness of stormwater pollution and solutions that public may participate in.
- Research stormwater programs at other agencies for education strategies that might be applied to Eugene's program.
- Monitor phone calls, correspondence and e-mail.

## **P1 - Educational Volunteer Activities**

### **Responsible Department/Division:**

Public Works / Parks and Open Space Division

### **BMP Contact:**

Parks & Open Space Division Director

### **BMP Description:**

Continue to refine the City's existing Stream Team volunteer program to involve citizens of all ages and socio-economic backgrounds in meaningful, hands-on and educationally oriented projects and activities related to protecting stormwater quality, promoting the use of native vegetation, and enhancing fish and wildlife habitat within the local urban related watershed.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Stream Team recruited, educated and put to work many new volunteers this year through partnerships with the University of Oregon and Lane Community College. Talking with instructors about the goals of the Eugene Stream Team resulted in students volunteering individually for 10 hours or whole classes coming out to do hands-on educational projects to protect water quality.
- The Eugene Stream Team has engaged six additional adoption groups since the last reporting period. These groups commit to working on their site for 3 years removing invasive vegetation, planting native plants, and conducting clean-ups on their sites.
- More than ten different schools volunteered with Stream Team in FY 2007. The educational components included visits to the classroom, exploration of various waterways, discussion of daily activities that affect water quality and hands-on improvement to our riparian areas including litter removal, planting, and mulching.
- Stream Team also has a new logo, brochure, and new steel tumblers to give to volunteers. Interpretive signage for the Native plant nursery is being fabricated.
- In partnership with the local chapter of Audubon, Stream Team recruited 12 volunteers who conducted daily monitoring of the birds this spring at Delta Ponds.
- In partnership with Oregon Department of Fish and Wildlife, Stream Team recruited, trained and coordinated the efforts of 10 volunteers to monitor fish at Delta Ponds in March. Each training always includes discussions of our role in maintaining water quality for humans and other species dependent on clean water.
- During the fiscal year 2007, more that 500 volunteers contributed over 3,000 hours working for the Eugene Stream Team to protect and enhance water quality and natural resource values within our local watershed. Volunteers of all ages and walks of life participated.
- Stream Team sponsored educational events, staffed booths, and provided tours and reached well over 200 more community members with the message that we are all dependent on clean water and we all have a role in keeping it that way.
- Weekly work parties at the two Native Plant Nurseries are exceptionally good opportunities for in depth education about our local water systems and our role in protecting water quality. Over 100 volunteers have contributed more than 600 hours this year. We have completed the first year of a large seed grow out, collection and cleaning process that has been highly successful.

- Stream Team volunteers participated in seed collection, salvage and propagation from cuttings to supply the vegetation grown and tended at the nursery. Other volunteers are planting out the vegetation along rivers, streams and ponds throughout the City.
- In FY 07 we planted out roughly 50% of the plant stock raised in the Native plant nursery.
- Over 2000 trees, shrubs, and forbs were planted by volunteers in FY 07.

### **Background:**

In conjunction with other, more formal, stormwater education programs, an aggressive, hands-on stormwater and natural resource enhancement volunteer program is an effective way to educate a wide segment of the populace about the impacts of non-point stormwater pollution. By providing both educational presentations to help promote the program and in-the-field activities such as work parties, interpretive tours and water quality and wildlife monitoring to name just a few, the City's Stream Team program can both teach the value of urban natural resource area as well as foster citizen stewardship of local streams, ponds and wetlands.

### **BMP Activities:**

- Recruit, coordinate, support, and provide the educational focus for Stream Team volunteers involved in the following ways: group adoption of natural areas associated with the stormwater system (such as Amazon Creek, local ponds, streams and wetlands); ad hoc volunteer projects; and site monitoring.
- Provide volunteers with the necessary tools and guidance in the following areas: remove debris and invasive vegetation, plant and maintain native vegetation, collect native plant seeds, salvage native plants, operate and maintain a native plant nursery; monitor portions of the stormwater system; conduct fish and wildlife monitoring and perform other education water related activities.
- Provide support for on-going educational campaigns (BMPs A1 and A2) for certain problem pollutants in Eugene's stormwater runoff including lead, mercury and bacteria.
- Provide support for educational campaigns (BMPs A1 and A2) about the causes of low dissolved oxygen in receiving waters, and the actions private landowners and businesses can take to minimize depletion of stream water dissolved oxygen.
- Contribute articles and Stream Team information to the City's Stormwater Connections and Eugene Outdoors newsletters which are distributed bi-annually in local newspaper.
- Develop news releases and City Council newsletter articles to promote significant Stream Team Volunteer activities.
- Provide educational materials (such as videos focused on local stormwater and wetland issues) and make presentations to interested groups and school classes upon request.
- Produce a regularly scheduled Stream Team newsletter and distribute to program volunteers and others upon request.
- Hold semi-annual celebrations for volunteers to meet each other and become familiar with diverse components of the Stream Team program.

### **Assessment Methods:**

- Solicit feedback on the program and effectiveness of outreach efforts.
- Track the number of schools and youth groups who participate in projects related to water quality and natural resource enhancements.

- Document the total number of volunteers who participate each year with Stream Team and the number of hours of volunteer time contributed.
- Track the number of new native plants that have been planted as part of Stream Team activities.
- Track the number of people who attend Stream Team related presentations and field tours.

### 3.4.2 Status of Planning, Capital, and Data Management BMPs

#### E1 - Stormwater Basin Master Plans

**Responsible Department/Divisions:**

Public Works / Engineering (implementation)

Public Works / Wastewater (updates)

**BMP Contacts:**

Engineering Division Director

Wastewater Division Director

**BMP Description:**

Implement and periodically update the City's 2002 *Stormwater Basin Master Plans* for the Amazon, Willow Creek, Bethel-Danebo, Willakenzie, Laurel Hill and Willamette River basins. Complete and implement the basin master plan for River Road – Santa Clara, in collaboration with Lane County. The basin plans convey a multiple-objective strategy for managing stormwater, and include: basin characteristics under existing and projected future conditions; a prioritized list of capital projects including waterway restoration, piped system upgrades, neighborhood water quality facilities, system rehabilitation, and retrofits of existing stormwater facilities; and other recommended implementation measures such as water quality standards for new development.

**Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Continue to use and update web portal site which was established in 2005. The 2002 Stormwater Basin Master Plans for Amazon, Willakenzie, Bethel Danebo, Laurel Hill, Willamette River and Willow Creek can be viewed or downloaded from the new web address: <http://www.eugene-or.gov/portal/server.pt> (follow links to Public Works > PW Engineering > Basin Master Plans). Printed copies may be purchased through a local print shop. A printed copy of the Basin Plans is also available at the downtown branch of the Eugene Public Library.
- Eugene and Lane County continued to collaborate on completion of the River Road – Santa Clara Basin Plan. Alternative “green street” concepts were developed for local streets in the context of basin planning, which will be implemented by modifying the City's local street standards through a separate process.
- XP-SWMM models for the Amazon, Willakenzie, Bethel Danebo, Laurel Hill, Willamette River and Willow Creek basins are in use by the City's engineering staff and the design/development community.
- The City's Capital Improvement Program 2008-2013 was adopted March 12, 2007 by the Eugene City Council. The CIP forecasts the City's capital needs for fiscal year 2008 through 2013 based on locally adopted long-range plans, goals and policies includes several priority projects identified in the 2002 Stormwater Basin Master Plans, including: Royal Node Stormwater Infrastructure and Central Amazon Enhancement Project (Titled: Amazon Stabilization Chambers to Garfield). The City's CIP is updated every two years.
- City and other public transportation and facilities capital improvement projects which have incorporated water quality features into their design and construction include:
  - East 18<sup>th</sup> Street Improvement project with bioswales incorporated into the design for water quality

- River Avenue Street Improvement project includes roadside swales for water quality.
  - Federal Courthouse building includes several bioswales for water quality
- Design completed or in progress for several public capital improvement projects which will benefit water quality:
  - Polk St. Outfall (water quality vault)
  - 34<sup>th</sup> Amazon Stream Enhancement
  - Royal Ave. Storm
  - Golden Gardens Improvements
  - A3 Channel Water Quality enhancements
  - Amazon Creek Outfall and Overlook Stabilization
  - Metro Waterways Study – Waterway Restoration Projects
- Stormwater development standards implemented (see BMP E4).
- Waterway protection proposal for water quality developed for future Planning Commission and City Council consideration, for: impaired waterways, tributaries to impaired waterways, and sensitive headwater streams.
- Project Managers Manual includes provisions to ensure that impact of new flood control projects on water quality is evaluated and considered in the design of projects.
- In implementing the stormwater Capital Improvement Program (i.e., Basin Plans water quality projects), documented location, type and other attributes of stormwater capital projects for purposes of evaluating their effectiveness and reporting progress under the city's NPDES permit.
- Continue to maintain a GIS coverage of water quality facilities and projects including such attributes as location, facility type, drainage area, and cost for all new water quality capital projects implemented (see BMP E3).

### **Background:**

Eugene's updated *Stormwater Basin Master Plans* were completed in 2002 for six of seven identified study areas or basins: *Amazon Creek*, *Bethel Danebo*, *Laurel Hill*, *Willakenzie*, *Willamette River*, and *Willow Creek*. The new plans were adopted by Administrative Order in April 2003. A draft basin master plan was developed for *River Road – Santa Clara*, an area with a mix of City and Lane County jurisdiction.

The new plans replace the City's 1990 Area-wide Drainage Master Plans which were focused exclusively on drainage and flood control needs. The new draft plans are multiple-objective in nature (flood control, water quality, stormwater-related natural resources) and are consistent with the adopted policies of the Comprehensive Stormwater Management Plan (CSWMP), the West Eugene Wetlands Plan (WEWP), and the Natural Resources Functional Plan (NRFP). The plans document the basin planning process and outcome, and incorporate recommendations from the Stormwater Department Advisory Committee. They include a 35-year Capital Improvement Plan for each basin, and proposed development standards related to water quality.

In 2004 the City entered into a cooperative agreement with Lane County related to stormwater services. The agreement includes a commitment to collaborate on completing the River Road – Santa Clara Stormwater Basin Master Plan. In 2005, City and County staff developed a

workplan, schedule and public involvement plan for completing the River Road – Santa Clara plan.

Capital projects identified in the basin plans are implemented through the Capital Improvement Program, or CIP, process. Proposed development standards are being implemented through ordinance adoption process to modify Eugene City Code (see also BMP E4: Stormwater Development Standards).

**BMP Activities:**

- Complete the River Road – Santa Clara Basin Master Plan.
- Update the Project Managers Manual to ensure that processes are in place to evaluate the impact of new flood control projects on water quality.
- In implementing the stormwater Capital Improvement Program (i.e., Basin Plans water quality projects), ensure documentation of location, type and other attributes of stormwater capital projects for purposes of evaluating their effectiveness and reporting progress under our permit. Ensure structures and/or mechanisms are in place to enable sampling, testing and evaluating effectiveness of representative facilities.
- Implement Stormwater Basin Master Plan strategies, including capital projects and recommended development standards (BMP E4).
- Evaluate the effectiveness of selected water quality capital projects at removing specific pollutants.
- Update Stormwater Basin Master Plan set at least once every five years.

**Assessment Methods:**

- Provide a copy of the 2002 *Stormwater Basin Master Plans* to DEQ.
- Ensure that the 2002 *Stormwater Basin Master Plans* are made available for viewing and printing in a variety of ways for ease of use.
- Incorporate projects identified in the Stormwater Basin Master Plans in the City's Capital Improvement Program and budget.
- Maintain a GIS coverage of water quality facilities and projects including such attributes as location, facility type, drainage area, and cost for all new water quality capital projects implemented.
- Selectively monitor certain public water quality facilities to determine effectiveness at removing pollutants.
- Participate in and contribute to regional efforts to evaluate and document the effectiveness of water quality best management practices.



## **E3 - Stormwater System Mapping and Data Management**

### **Responsible Department/Division:**

Public Works / Engineering

### **BMP Contact:**

Engineering Division Director

### **BMP Description:**

Keep up-to-date inventories and maps of the public and private, natural and constructed, stormwater system. Include mapping of water quality and flow control facilities such as grassy swales and detention basins. Develop and integrate asset inventory data and geographic information system (GIS) systems which describe the conveyance system, water quality attributes and related natural resource information. Integrate information generated through BMPs such as E1 and E4 which create or modify system components and/or change the attributes of the stormwater system.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Added new facilities to stormwater database and GIS - performed routine maintenance procedures to add new stormwater facilities from as-construct drawings. New stormwater facilities were digitized as GIS layers. Descriptive map attributes were entered in CASS WORKS Infrastructure and Asset Management database and later copied to GIS layers. In addition, occasionally upgrades and modifications were made to the facilities and attributes as directed by Public Works Maintenance.
- Conducted database and GIS consistency review - each quarter a series of database programs were executed to compare the CASS WORKS database and GIS attributes and list discrepancies. Inconsistencies were researched and corrected.
- Researched and added missing stormwater attributes - many stormwater pipe length, diameter and as-construct attributes are missing in the database and GIS, especially for older facilities. A focused search for these missing attributes is being conducted and so far approximately 6500 have been located and entered.
- Improved map accuracy of GIS stormwater layers - a new, more spatially accurate taxlot basemap was completed in 2006 and has replaced the old version. The stormwater facility and related GIS map layers, including storm basins and basin studies, were spatially adjusted to align with the new basemap. This was a very labor intensive effort.
- Modeled stormwater system capacity and flood potential – the stormwater GIS data was used to support modeling the system's capacity and identify potential flood problems in the River Road/Santa Clara area of the City.
- Evaluate FEMA flood map revision tools using local information - the City is participating in the 2 phase FEMA Flood Map Modernization (MapMod) pilot project to evaluate web-based GIS tools used to refine and display FEMA flood maps. Phase 1, FEMA software training, was finished last year. The second phase is ongoing and involves testing and evaluating the edit and display capabilities of the software using local data. A document is being prepared to summarize the strengths and weaknesses of the software. The evaluation is about 50% complete.
- Improve private stormwater facility (PSF) data maintenance – a data maintenance plan is being developed to add more detailed PSF data to the CASS WORKS Infrastructure and Asset Management database and GIS map layers. It will also help streamline the PSF data maintenance process.

- Refining waterbody GIS map layer – a plan has been developed to improve the map accuracy and add descriptive attributes to the waterbody GIS layer. The map features were recently adjusted to more closely align with the waterbodies displayed on high resolution 2004 air photos. The plan calls for more precise adjustments when 2008 air photos are acquired and interfacing the waterbody layer with stormwater and wetland data. Also, the waterbody attributes will be modified to match Federal standards.
- Produced Letter of Map Amendment (LOMA) and Revision (LOMR) database and GIS map refinement plan – the plan for adding LOMA/LOMRs, which identify changes to the FEMA 100 year flood maps, in the LOMA/LOMR database and GIS layer has been revised to include additional descriptive attributes and map features.
- Enhanced drywells attributes – DEQ permit numbers for about 20 private drywells were obtained and added to the CASS WORKS database and drywell GIS layer.

### **Background:**

Mapping and data management provides valuable supporting information which allows the City to effectively accomplish many elements of the NPDES permit requirements. For example, an accurate inventory and mapping of open waterways is critical to implementation of water quality protection measures related to open waterways.

Stormwater infrastructure layers are updated on a weekly and monthly basis on the GIS and asset inventory systems. Sources of update information are stormwater drainage studies, as-construct drawing of capital projects, and observations in the field by engineers and maintenance crews.

Software applications utilizing this data are developed and maintained to provide on-line access to system information for staff involved in all aspects of system planning, administration, analysis, operations and maintenance. Paper map sets reflecting updated system information are produced annually for use by field personnel.

### **BMP Activities:**

- Update stormwater system inventory and GIS on a weekly and monthly basis
- Develop, upgrade and maintain software applications which make system information available to staff.
- Update stormwater infrastructure paper map sets annually.
- Along with adoption of Stormwater Development Standards (E4), help to ensure that data management needs are identified and protocols established for documenting appropriate information to ensure that operations and maintenance, inspection and enforcement, and BMP effectiveness objectives are met.
- In implementing the capital improvement projects outlined in the 2002 Stormwater Basin Master Plans, help to ensure documentation of location, type and other attributes of stormwater capital projects for purposes of evaluating their effectiveness and reporting progress under our permit.

### **Assessment Methods:**

- Report on map and database update activities annually.
- Survey map and data system users bi-annually.

## **W1 - Address Impacts of City Activities on Water Quality**

**Responsible Department/Division:**  
Public Works / Wastewater Division

**BMP Contact:**  
Wastewater Division Director

### **BMP Description:**

Implement the results of the City's environmental assessment of City activities that have the potential to impact the water quality of Eugene's stormwater and receiving waters.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Continued Integrated Pest Management training for Parks & Open Space and other Public Works staff. Established a staff team to develop a city-wide policy regarding the use of pesticides, herbicides and fertilizers to establish consistency across the organization.
- Continued to experiment with non-mechanized techniques for invasive species removal.
- Further expanded availability and use of bicycles by City staff at various work locations.
- Continued to expand the use of native plants in City landscaping and park areas.
- Continued to incorporate water quality treatment facilities into the design of public transportation and facilities projects (see E1).

### **Background:**

A city-wide environmental review was conducted to evaluate City activities that have the potential to positively or negatively impact the environment, including the water quality of Eugene's receiving waters. The assessment, completed in 2001, provided a list of all City activities with the potential for environmental affects, and a screening of these activities to determine whether they have the potential to affect water quality specifically. Information about City activities collected included: frequency of the activity; number of locations where that activity occurs; types of materials or equipment used to perform each activity; and type and amount of waste reclaimed, produced, or managed by each activity. Then each activity was evaluated for degree of impact (including water quality) and ranked according to degree of positive or negative impact. The assessment is being used to guide the development of new policies and procedures intended to further reduce the City's negative impact on water quality.

### **BMP Activities:**

- Continue to work with Fire Department staff to identify and implement procedures to mitigate or otherwise manage runoff from fire suppression and clean-up activities.
- Continuing with the highest priority impacts on water quality, develop policies, programs and procedures to reduce the impacts of City activities on water quality.
- Implement programs and procedures

### **Assessment Methods:**

- Develop report on identified significant water quality impacts
- Develop procedures and practices to reduce water quality impacts
- Provide training to affected staff

### **W3 - Bacteria Pilot Study**

**Responsible Department/Division:**

Public Works / Wastewater

Public Works / Parks & Open Space

**BMP Contact:**

Wastewater Division Director

Parks & Open Space Division Director

**BMP Description:**

Conduct a pilot study in the Amazon Creek stormwater basin to confirm the existence of bacteria contributions from Eugene's MS4 system, and identify the sources of bacteria. If appropriate, apply specific BMPs to address these specific sources and measure BMP effectiveness using quantitative and qualitative methods.

**Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Sampling and analysis of water samples from Amazon Creek at four monitoring locations (Chambers, pedestrian bridge, Polk, and Jefferson) for E. coli and fecal coliform; five sampling events completed since November 2006.
- Sampling and analysis of water samples from Westmoreland area stormwater conveyance system at four monitoring locations (MH55402 at Albertsons; MH56329 at Friendly & 16th; MH51267 at Tiara; MH80382 at SE Westmoreland Park) for E. coli and fecal coliform; between four and five sampling events completed since November 2006. One monitoring location on Willow Creek at 18th (MH80382) has been sampled five times for purposes of background water quality comparison.
- Two field surveys conducted in February and May 2007.

**Year 3 Accomplishments (July 1, 2005 – June 30, 2006)<sup>1</sup>:**

- Generated maps of the stormwater system for use in selecting pilot study sub-basin, locating monitoring stations, informing BMP selection and design, and assessing BMP effectiveness. Selected Amazon Creek sub-basins for pilot study.
- Developed check sheet to assess conditions within the selected sub-basin, including for example the amount, type and location of wildlife and domestic pets; location and number of domestic animal waste piles; conditions within commercial loading areas, recycling areas and garbage dumpster areas.
- Purchased flow monitoring and automated sampling equipment to enable staff to begin collecting stormwater samples beginning in fall 2006 to help determine potential sources of bacteria in the study area.

**Background:**

The A3 Channel, Amazon Diversion Channel, and Amazon Creek are on the state's 303(d) list as "water quality limited" for bacteria. Stormwater monitoring data indicates that bacteria

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<sup>1</sup> A historical record of accomplishments is included in this report for BMP W3, Bacteria Pilot Study. The nature of this BMP is conducive to a historical record to describe status, in that is a pilot study, being conducted for a discrete period of time, and is progressive with each phase building upon the results of the previous phase.

concentrations in Eugene's stormwater are above the state water quality criterion and therefore likely contribute to the bacteria problem. A pilot study of the Polk Street sub-basin will be conducted to achieve the following goals: 1) confirm whether or not Eugene's MS4 is a contributor of bacteria to receiving waters; 2) to better understand bacteria source contribution areas through observation and monitoring; 3) design and implement BMPs to reduce bacteria loads to stormwater and Amazon Creek; 4) assess through additional monitoring BMP effectiveness in reducing bacteria loads to stormwater and, hence, Amazon Creek. Knowledge gained from BMP effectiveness in the Polk Street sub-basin will be assessed for application to other areas within the Amazon basin with the objective of reducing bacteria in the A3 Channel, Amazon Diversion Channel, and Amazon Creek.

Common sources that could potentially be an issue for Eugene's stormwater system include wildlife waste (e.g. birds, nutria, mice, squirrels), domestic pet waste, human activities and sediment (bacteria can accumulate and concentrate in deposited sediments).

Eugene's proposed bacteria reduction strategy is a combination of targeted education (BMP A2), existing systematic field investigation (BMP M7) and illicit discharge programs (BMP M1), existing maintenance practices (BMP M5), new water quality development standards (BMP E4), monitoring to determine natural background bacteria levels, and this new BMP W3: pilot study to confirm bacteria source(s) and to evaluate the effectiveness of BMPs. The bacteria pilot study includes three phases: 1) source identification, 2) BMP implementation, and 3) evaluation of BMP effectiveness.

While the study will be conducted primarily within one selected sub-basin of the Amazon Creek major basin (Polk Street sub-basin), discrete areas outside of the sub-basin may also be considered which would help to efficiently meet study objectives. The stormwater system for the Polk Street sub-basin serves an area of about 1009 acres. Land use consists of 58% single-family homes, duplexes and mobile homes; 21% roads; 6.7% vacant areas; 4.5% park area; 4.4% educational, and 2.6% multi-family.

*See Monitoring Plan, Section 9.2, for more detailed information about monitoring for the Bacteria Pilot Study.*

#### **BMP Activities:**

- Generate maps of the stormwater system for use in selecting pilot study sub-basin, locating monitoring stations, informing BMP selection and design, and assessing BMP effectiveness. (Study Year 1, City's Fiscal Year (FY) 07)
- Assess conditions within the selected sub-basin, including for example the amount, type and location of wildlife and domestic pets; location and number of domestic animal waste piles; conditions within commercial loading areas, recycling areas and garbage dumpster areas. Collect and test water quality samples for bacteria at selected locations in the sub-basin to help determine potential sources of bacteria. (Study Year 1, FY07)
- Based upon the results of the first phase of the study, select appropriate BMPs to specific identified or suspected bacteria sources. Design, construct, and implement BMPs as appropriate. BMPs selected may include: door-to-door contact with business owners and residents; direct informational mailings; modifications to catch basin cleaning

frequencies; specialized (bacteria-related) storm drain stencils; doggy bags in parks; presentations to neighborhood groups and to school science teachers; modifications to park rules (e.g. “no feeding the wildlife”); and modification of waterway maintenance practices. (Study Years 2 & 3, FY08 & 09)

- Assess conditions within the selected sub-basin after BMPs have been implemented. Collect and test water quality samples for bacteria at selected locations in the sub-basin to help assess the effectiveness of BMPs implemented. Analyze data to assess the affect on bacteria levels from the application of selected BMPs. (Study Year 3, FY09)

**Assessment Methods:**

- Document (pre-BMP implementation) observations with check sheets, notes, and digital photos.
- Document (pre-BMP implementation) water quality monitoring data and analyses.
- Document type, location, design, and installation of selected BMPs.
- Document (post-BMP implementation) observations with check sheets, notes, and digital photos.
- Document (post-BMP implementation) water quality monitoring data and analyses.

### **3.4.3 Status of Construction Site Management and Development Standards BMPs**

#### **E2 - Erosion Prevention and Construction Site Management Program**

**Responsible Department/Division:**

Public Works / Engineering

**BMP Contact:**

Engineering Division Director

**BMP Description:**

Administer and monitor the Erosion Prevention and Construction Site Management Program. Implement program elements which prevent and/or control erosion, sedimentation, and other construction related impacts to stormwater quality within the City limits. Continue education and outreach related to new techniques/practices. Screen projects for sensitive area status, conduct plan reviews, issue permits, conduct inspections, and provide compliance enforcement as appropriate.

**Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Reviewed and approved approximately 98 residential erosion permits
- Reviewed and approved approximately 68 commercial erosion permits
- Performed approximately 1062 site inspections
- Responded to approximately 52 complaints from the public
- Notified approximately 120 permit holders of the required annual permit renewal
- Renewed approximately 51 permits.
- Issued 11 permit noncompliance notices, including 3 penalty violations
- Continued our role as DEQ agents for the 1200-C permit.
- Actively involved in registering approximately 34 DEQ 1200-C permits
- Participated in educational forums within the City and with the public.
- Updated the Erosion Prevention web site
- Expanded role at the Permit and Information Center due to extended hours.
- Two program staff achieved ODOT certification for the CECI (certified erosion control inspector) program.

**Background:**

Construction site erosion has the potential to be the most significant source of sediment in stormwater runoff. Sites are susceptible to erosion when vegetation is removed and soils exposed. Once eroded sediments enter waterways, they can block sunlight, limit plant growth, and harm aquatic life by removing oxygen from the water. Other pollutants, including nutrients, bacteria, metals, and some toxic substance, attach to sediments and can thereby also be carried into waterways. Properly managing construction site activities effectively prevents and/or minimizes erosion and sedimentation materials from leaving development sites.

The City adopted an Erosion Prevention Ordinance and an Administrative Order in 1996. All persons engaged in construction activities must implement construction site management practices designed to protect the city's stormwater system. Construction sites larger than one acre or within an identified sensitive area require an erosion permit before any ground disturbance

activity. A development site is considered a sensitive area if it meets any one of the following criteria: a) the slope of the parcel is greater than 10%; b) the site contains highly erodible soils; or c) the site has the potential to directly drain into a water feature or the water feature's designated buffer area.

Construction site management practices are the steps taken to prevent erosion, sedimentation, or discharge of contaminants from the construction site. Although there are a wide variety of options to choose from, mandatory practices are required during the wet weather season (October 15 through May 15). Fact sheets and standard drawings are provided for construction activity that does not require an erosion permit. Individual construction site management plans are required for construction activities that require an erosion permit.

### **BMP Activities:**

Continue to monitor and enforce erosion prevention and construction site management practices within Eugene. Key program components include:

- Protect water features adjacent to sites under development with slopes of 10% or greater, or with erodible soils, by requiring permits and construction site management plans.
- Conduct outreach and educational activities for principal players (e.g., construction equipment operators, developers, and inspectors)
- Coordinate with BMP M1 (Enforcement for Improper Discharges) and A1 (Best Management Practices for Businesses).
- Finalize erosion design manual which includes information about proper techniques for erosion prevention as well as implementation guidelines, and make it available to the development community.
- Prepare an annual education program.
- Contract with local construction company for summary abatement of erosion violations.
- Maintain data base for tracking permits, inspections, complaint violations and educational outreach.
- Enforce minimum wet weather erosion prevention BMPs.

### **Assessment Methods:**

- Track the number of complaints received and violations cited.
- Track methods of educational outreach conducted, frequency of outreach, attendance at outreach events, and feedback from participants.
- Track annual number of erosion permits and inspections.
- Track annual permit renewals monthly.
- Provide final erosion design manual to local contractors and DEQ.



## **E4 - Stormwater Development Standards**

### **Responsible Department/Division:**

Public Works / Engineering

### **BMP Contact:**

Engineering Division Director

### **BMP Description:**

Finalize, implement, and enforce stormwater development standards: regulations for locating, designing, constructing, and maintaining water quality facilities for new development and significant re-development. (Note: Stormwater development standards are controls for post-construction water quality. Standards for erosion control during construction related to new development are covered under BMP E2).

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Stormwater Development Standards Ordinance was approved June 12, 2006 and became effective July 14, 2006.
- A companion design manual, the Eugene Stormwater Management Manual was prepared and adopted administratively July 17, 2007.
- Implementation of the ordinance included training internal staff and updating application forms and plan review and inspection policies to incorporate the new standards.
- Staff continue to provide stormwater quality training and education sessions for the design and development community. Sessions were held October 9, November 6, and December 6 along with many one-on-one sessions with individual designers. Staff presented the Stormwater Development Standards to the National Association of Women in Construction (NAWIC) and the American Society of Landscape Architects.
- Existing staff review and permit privately engineered public improvement plans for city owned and city maintained facilities and engineering construction inspection staff inspect city owned and city maintained facilities. Privately maintained facilities are reviewed and permitted by Permit and Information Center Engineering staff with an inspector from PW Maintenance inspector inspecting the construction of the private facilities.
- During the land use review process; 63 tentative partitions; 13 final partitions; 23 tentative subdivisions, 3 final subdivisions; 4 tentative planned unit developments; 7 conditional use permits; and 11 site reviews were received and reviewed for applicability to the new Stormwater Development Standards.
- Of the land use applications received; 41 tentative partitions; 13 tentative subdivisions; 1 tentative planned unit development; 2 conditional use permits; and 6 site reviews were deemed complete. Four tentative partitions; 2 tentative subdivisions; 1 tentative planned unit development; 2 conditional use permits; and 2 site reviews expired or were withdrawn by the applicant.
- Of the land use applications deemed complete; 32 tentative partitions; 10 tentative subdivisions; 1 conditional use permit; and 4 site reviews were approved.
- Of the approved applications, 1 conditional use permit was approved with green infrastructure for water quality treatment; and 4 site reviews were approved (2 of the approved applications were not applicable to the standards and with the other two, one implemented a private structural treatment device and one implemented a combined treatment system of green infrastructure with a structural device).
- Approved tentative partitions, tentative subdivisions, and tentative planned unit

developments must submit a final land use application before they can submit for construction permits for the water quality infrastructure.

- Thirteen final partitions were submitted, only 4 were approved (3 incorporated green infrastructure for water quality and 1 was not applicable to the standards because no new impervious surfaces were proposed.)
  - Three final subdivisions were submitted, none of these were approved.
  - No final planned unit developments were submitted.
- Forty-two commercial building permits were reviewed and approved for water quality treatment. All will be privately owned and privately maintained.
- Twenty-three residential building permits were reviewed and approved for water quality treatment (all implemented green infrastructure).
- Forty-seven public improvement projects were worked on during the year; 9 were applicable to water quality treatment and 38 were not. Design work on seventeen projects was completed. Nine projects implemented green infrastructure for water quality treatment; 2 implemented structural devices; and 4 implemented a combined system of green infrastructure and structural devices. All will be publicly owned and maintained by the city.
- Thirty-five privately engineered public improvements were submitted during the year; 24 of those were approved (9 met the applicability criteria for implementing water quality treatment and 15 did not). Of the privately engineered projects approved, 4 implemented green infrastructure for water quality treatment; 3 implemented structural devices; and 2 implemented a combined system of green infrastructure and structural devices. All will be publicly owned and maintained by the city.
- As of June 30<sup>th</sup> construction of the approved facilities was not completed. Year 5 report will include details on inspection and approval of the construction.

### **Background:**

There is a direct link between impervious surfaces associated with stormwater runoff from urban development and the quality of the City's surface and ground waters. As properties develop, the impervious surfaces that are created increase the amount of runoff during rainfall events, disrupting the natural hydrologic cycle. Without control, these conditions erode stream channels and limit groundwater recharge. New and expanded parking lots, roadways, and rooftops increase the pollution levels in stormwater runoff that is transported to streams, rivers, and groundwater resources. Protecting these waters is vital for a great number of uses, including fish and wildlife habitat, recreation, and drinking water.

The City's proposed stormwater development standards will: address future water quality impacts from new development; address the existing water quality condition through re-development; ensure that sensitive headwater streams are not further impacted from new development; and address high pollutant land uses and activities.

Stormwater development standards will be implemented by adoption of an ordinance and associated design manual, establishment of an inspection/enforcement program, identification and budgeting of necessary resources to implement the new program, training related to the new requirements, evaluation, and adaptive management.

**BMP Activities:**

- Complete review process with Stormwater Department Advisory Committee, a group of citizens providing feedback on City staff recommendations.
- Conduct presentations to stakeholder groups and host an open house to obtain feedback on the proposed standards in advance of the adoption process.
- Determine personnel needs to oversee the design review, inspection, enforcement, monitoring and maintenance of water quality facilities.
- Review Street Design Standards for consistency with water quality standards; evaluate the need for any revisions to street design standards or related implementation processes.
- Finalize the draft stormwater development standards and process for adoption by elected officials by the end of Permit Year Three.
- Provide education and training for City staff and the design and development community.
- Establish an inspection and enforcement program to ensure compliance with construction, operations and maintenance requirements for water quality facilities.
- Implement new stormwater management requirements by the end of Permit Year Three.
- Develop a method for assessing the effectiveness of the stormwater development standards and associated facilities.
- Develop an on-going method for identifying proposed capital projects where water quality standards should be incorporated, and develop a method for incorporating the new standards.
- Review the design manual every three years and update as appropriate, to reflect changing conditions, evolving technology, and lessons learned.

**Assessment Methods:**

- Number of outreach events, including Public Works Stormwater Department Advisory Committee meetings and presentations to special interest groups.
- Number of training workshops and workshop attendance.
- Copy of ordinance and associated design manual to DEQ.
- Number of private projects incorporating water quality facilities.
- Number of public projects incorporating water quality facilities.
- Number of facilities constructed or approved.
- Number of inspections and maintenance activities performed.
- Results of water quality monitoring for selected facilities.

### **3.4.4 Status of Operations and Maintenance BMPs**

#### **M4 - Prevent Leaks and Spills from Municipal Vehicles and Equipment**

**Responsible Department/Division:**  
Public Works Maintenance Division

**BMP Contact:**  
Maintenance Division Director

##### **BMP Description:**

Continue existing preventive maintenance program for all municipal vehicles and equipment in order to prevent or correct sources of vehicle fluid leaks. Continue to implement employee education practices and field operations procedures to detect and report leaks and to prevent incidences of fluid and material spills from municipal vehicles. Continue program of equipping municipal trucks and large mechanized equipment with renewable, spill response kits.

##### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Fleet Services completed 1363 scheduled preventive maintenance inspections for this reporting period as part of the City's leak prevention program. Fleet Services perform 1058 17-point safety and operational inspections on non-scheduled work for the reporting period as part of the leak prevention program.
- The Maintenance Division Tool Crib reported 7 spill kits issued during this reporting period.
- We had a total of 2 recorded clean up incidents in our program database which involved the Spill Response Programs resources. One was an oil spill, one was from Diesel fuel. Both were successfully cleaned up with minimal impact to our Storm-water and/or the environment.
- The Storm-water quality structure was cleaned twice during the period with no structure failures or other related maintenance required.

##### **Background:**

An on-going preventative maintenance program has resulted in a reduction of possible vehicle fluid spills from municipal vehicles and equipment. Since 1997, custom-made spill kits have been issued for nearly every public works vehicle. Vehicle spill kits are now a standard issue item from the Maintenance Division Tool Crib. Spill kit effectiveness continues to be monitored.

This BMP includes application of structural BMPs when control measures are deemed necessary for municipal facilities with high potential for leaks and spills, such as service vehicle/heavy equipment yards.

##### **BMP Activities:**

- All municipal cars, service vehicles, fire apparatus, and large mechanized equipment are inspected and serviced on a routine and frequent basis.
- Vehicles found with fluid leaks or with worn/frayed hydraulic lines are either repaired immediately or taken out of service until necessary repairs can be made.

- All public works vehicles and equipment are issued custom, renewable, spill kits as a standard issue item from the Maintenance Division Tool Crib.
- Staff will replenish materials as the spill kits are used.
- Staff will issue kits to new Maintenance Division and Public Works vehicles and equipment as appropriate.
- The spill kit program will continue to be monitored for effectiveness.
- A stormwater quality structure was installed at the Public Works Roosevelt Yard to treat storm runoff for sediments, oil, grease, and floatables.
- The performance of the structural BMP will continue to be monitored.
- Service vehicle and equipment operators are both trained to conduct routine vehicle inspections and are periodically reminded to be especially careful of spilling while performing fueling or lubricating procedures.
- Fueling islands are stocked with absorbent material close at hand so small fuel spills can be cleaned up before they are tracked out into exposed areas.
- Staff will continue to evaluate new service vehicle and equipment purchases to look for opportunities to minimize the potential for materials spills.
- Fleet Services is currently evaluating the use of a new more environmentally friendly hydraulic oil for Parks and Open Space equipment which is used in the wetlands.

#### **Assessment Methods:**

- Document type, frequency, mileage interval, and leak related problems found for both scheduled and unscheduled vehicle maintenance service.
- Conduct ongoing tracking and logging spill kit issuance and usage.
- Document significant incidents of spills or fluid releases from City vehicles.
- Use Fleet Management System to track preventive maintenance inspections and track analysis for fuel, oil, coolant etc. consumption for all City-owned equipment

## **M5 - Public Stormwater System Cleaning Programs**

**Responsible Department/Division:**  
Public Works Maintenance Division

**BMP Contact:**  
Maintenance Division Director

### **BMP Description:**

Continue existing program which includes: frequent, systematic cleaning of the components of the public stormwater system such as catch basins, pipes, culverts, inlets, and stormwater quality devices; removal of sediment deposits and cleaning out of accumulated debris from open drainageways as-needed; annual curbside pickup of leaves on all City streets to prevent plugging catch basins or being discharged into local receiving waters and; documenting quantities of material removed from each structure and the type and quantity of stormwater pollutants found. Using the maintenance management system, develop methods to identify sites requiring more frequent cleaning or show a history of continuing pollution problems. Research and monitor developments in maintenance technology and methods for both piped systems and open channels that further minimize impacts to stormwater quality and natural resource values. Revise cleaning practices as necessary and appropriate.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Continued low impact vegetation removal practices at inlets and outlets to increase the flow in open drainage ways.
- Continued to utilize operations crews across 17 of the 21 available weekly shifts. This includes two full-time stormwater jet/vac trucks. These crews provide O & M functions to the piped system, manholes, sediment traps and inlets, as well as provide timely respond to service requests.
- Continued to utilize catch basin tracking program. The data is compiled into a spreadsheet which allows for future analysis of structures. This information can be utilized to develop a more responsive cleaning schedule for the existing cleaning program. Data analysis can be used to create catch basin cleaning routes. Also, the catch basin tracking program data provides staff a list of map corrections, error or omissions and an inventory of bottomless catch basin structures.
- Continue cleaning and performing Closed Circuit Television inspection on storm lines and catch basins for Pavement Preservation Projects. Performing Closed Circuit Television inspection identifies potential conveyance problems.
- Continue to identify catch basins that need to be change out to curb in-lets to reduce seasonal flooding.
- Update pedestrian and bike path inspection book. This book enables the Stormwater Team to take a more systematic approach to removing vegetation that accumulates on pedestrian and bike paths.
- To keep up with new technology and stay efficient in stormwater cleaning programs a new replacement vacuor was purchased.

### **Background:**

Schedule A of the City of Eugene's NPDES permit requires the City to: "Reduce the discharge of pollutants from the municipal separate storm sewer system to the maximum extent practicable" and to "effectively prohibit non-stormwater discharges into the Municipal Separate

Storm Sewer system unless such discharges are otherwise permitted by an existing...NPDES permit...” The term illicit discharge is defined in the City’s NPDES permit as “...any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to an existing NPDES permit and discharges resulting from firefighting activities.”

To assist with compliance of Schedule A requirements, City crews routinely remove accumulated sediments, debris, and other pollutants from the piped stormwater infrastructure and open waterways. All stormwater conveyance lines with a history of potential conveyance problems are tracked and each fall those lines are cleaned and sawed to ensure full conveyance capacity. Storm drainage system catch basins are inspected and cleaned to prevent localized flooding and to detect potential hazards. Key inlets and outfalls are inspected each fall prior to the rainy season to ensure they are operational and not blocked by vegetation or other debris. All maintenance is done in a way to protect water quality and other natural resources.

Open drainage channel maintenance practices are implemented according to provisions outlined in U.S. Army Corps of Engineers Flood Control Regulations and the Levee Encroachment Standards and Procedures. In addition, open drainage ways are maintained according to the Open Waterway Maintenance Plans. These plans are intended to protect and enhance both stormwater quality and natural resources values while continuing to maintaining sufficient conveyance capacity. City crews also annually undertake a systematic curb-side leaf pick-up program. This program is designed to prevent potentially harmful pollutants from entering public waterways, and to minimize localized flooding during heavy rain events.

#### **BMP Activities:**

- Maintain stormwater infrastructure database (“Cassworks”).
- Generate “Cassworks” work orders for infrastructure maintenance.
- Seasonally inspect key inlets and outfalls; remove any blocking vegetation or other obstructions.
- Clean catch basins and connecting pipes of accumulated sediment, debris, and other pollutants on a systematic basis.
- Record quantity of debris removed and identify structures requiring more frequent cleaning cycles.
- Evaluate and update systematic cleaning schedules based on information gathered by field observations and analysis of individual loadings and capacity of the system.
- Evaluate system performance.
- Dispose of collected materials at a waste drainage pad at the Lane County Solid Waste Collection Facility.
- Inspect open drainage channels for obstructing vegetation and accumulated sediment and debris; remove obstructing materials in accordance with the Open Waterways Maintenance Plans.
- Place erosion control materials and re-seed exposed soils on channel banks and tops.
- Collect leaves from City streets two months of the year and deliver to requesting citizens, or dispose of at the City’s leaf composting site.
- Research new developments in pipe and open channel cleaning equipment, methods, and techniques.

- Revise and adjust system cleaning practices and schedules as appropriate to increase the effectiveness of the program.

**Assessment Methods:**

- Document number of structures cleaned, quantities and type of materials collected and enter into the “Cassworks” database.
- Document lineal feet of vegetation maintenance performed on public open waterway system.
- Analyze materials collected from problem areas to determine if source can be identified.
- Analyze production data from vacuum trucks on a continual basis and make modifications as necessary to ensure maximum water quality benefits.
- Review weigh tickets from City vehicles disposing of collected materials at County facility.
- Continue periodic review and evaluation of data to identify trends in cleaning frequency, cleaning program efficiency, and system performance problems.
- Record number of Catch Basins cleaned.
- Record amount of debris cleaned from each catch basin.
- Record footage of stormwater lines cleaned, jet or saw.
- Record amount of debris cleared from lines and net tons dumped
- Complete inspection documentation of key inlets and outfalls.
- Complete inspection documentation of open drainage ways and records of debris removal.
- Record tons of leaves collected during curb-side pick-up program.



## **M6 - Street Sweeping Program**

**Responsible Department/Division:**  
Public Works Maintenance Division

**BMP Contact:**  
Maintenance Division Director

### **BMP Description:**

Continue the existing program of both mechanical brush and vacuum sweeping of publicly maintained roads, bike paths, and parking lots. Perform on-going review of the revised sweeping practices and schedules implemented as part of the City's previous stormwater discharge permit. Continue to monitor and evaluate new developments in sweeping technology and methods and revise the existing sweeping program as appropriate and feasible to maximize water quality benefits.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Sweeper crew continues to follow best management practices related to the sweeper operators. Sweeper operators work varying shifts so that out of 21 shifts available in a seven day week only 3 are not covered by sweeper operators. Staff responds to emergency request during no-working shifts. Continue to investigate debris management alternatives which could reduce the amount currently deposited in a landfill, including recycling operations. Continued to document and track the sweeping activities.
- Updated traffic calming devices inspection book. This book enables the Stormwater Team to take a more systematic approach to hand sweeping pollutants that accumulate around traffic calming devices.
- Analyzing a new sweeper drop box location in the Coburg Road area to improve sweeping efficiency.
- In process of evaluating the replacement of 2 new air sweepers.

### **Background:**

The City's NPDES permit requires a proactive approach in preventing (to the extent practicable) the discharge into the public stormwater system any substances other than stormwater. Arterial, collector, residential streets, bike paths, and parking lots receive potential pollutants through daily use. If left alone, pollutants accumulated on such surfaces could affect the quality of receiving waters by being washed into the public stormwater system during rain events. These pollutants could include metals, hydrocarbons, other chemicals, dirt, and other unwanted debris.

Therefore, the City has in place a program for the systematic and comprehensive sweeping of publicly maintained streets, bike paths, and parking lots. The City maintains an aggressive seven-day-a-week, multi-shift sweeping schedule that utilizes a fleet of two mechanical broom sweepers, two regenerative air vacuum sweepers, and a smaller truck chassis-mounted vacuum sweeper. This street sweeping program complements the City's catch basin cleaning and leaf pick-up programs. In addition, City staff conducts ongoing research for new technologies, methods, and expertise related to street sweeping that improves water quality. The existing sweeping program is continually evaluated for effectiveness; modifications in the program are made as necessary to ensure effectiveness in achieving maximum water quality benefits.

**BMP Activities:**

- Determine the type of sweeper to use in varying conditions.
- Establish sweeper routes and frequencies for optimum effectiveness and efficiency.
- Analyze street sweeping operations on a continual basis and make modifications as necessary to ensure maximum water quality benefits.
- Perform sweeping operations during eighteen of a possible twenty one workshifts per week.
- Establish sweeper debris drop boxes locations strategically throughout the City.
- Dump sweeper debris into drop boxes and have the debris disposed of through contract.
- Maintain records of streets swept and amount and types of material collected.
- Perform analysis of materials collected.
- Sweep behind City leaf pick-up crews to remove remaining debris.
- Evaluate street sweeping technologies and equipment.
- Determine methods and schedule for high pollutant load areas.

**Assessment Methods:**

- Document and track the type and frequency of sweeping in residential areas and in high pollutant source areas (downtown, commercial, and industrial areas), the amount of curb miles swept, and the amount of swept material recovered.
- Document any changes to practices or schedules to promote stormwater quality benefits.
- Record the amount of bike paths and alleys swept
- Record the amount of water used and yards of debris collected/dumped
- Record the amount of sweeping performed in support of the leaf pick-up program.

## **M8 - Winter Road Sanding and De-Icing Program**

**Responsible Department/Division:**  
Public Works Maintenance Division

**BMP Contact:**  
Maintenance Division Director

### **BMP Description:**

Continue existing program for the application and cleanup of winter traction sand on publicly maintained roads and parking areas in conjunction with the application of a pre-wetting agent designed to reduce the need for sanding. Continue with research efforts to identify and evaluate new technology and strategies for application of environmentally friendly chemical anti-icing and de-icing agents. Conduct research into new O&M methods, practices, and efficiencies which may further limit the runoff of sanding related pollutants to the storm system.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Used new aggregate pre-wetting system mounted on sanding unit. This new system is pre-wets sanding rock with deicing/anti-icing agent prior to being applied to road surface. Pre-wet aggregate adheres to road surface and/or ice which in turns reduces the need for reapplication due to displacement from traffic.
- During reporting period 214.75 tons of sanding rock was applied to 92.34 lane miles of streets. Application of sanding rock took place on 16 separate days.
- During reporting period 1163 gallons of Calcium Magnesium Acetate (CMA) was applied to 58.5 lane miles of streets. Application of CMA took place on 6 separate days.
- Sanding locations were provided to stormwater maintenance team following all sanding events for post storm collection.
- In the process of purchasing three 5 yard aggregate sanders with pre-wetting systems. Purchasing these pre-wet sanding units will reduce the need for repeated applications.
- Developed training manual for the use of Calcium Magnesium Acetate (CMA) application.

### **Background:**

The primary goal of this program is to respond to weather related hazards, specifically icy roadways, in a fashion which maintains travel along designated routes. The management of the hazard could have an impact on water quality through the application of materials on a roadway surface. A key component of this program seeks to minimize the impact while meeting the program goals. In addition to applying traction sand during ice and snow events, the City has been authorized to conduct a small pilot program of applying calcium magnesium acetate (CMA). This anti-icing material is environmentally friendly and staff will apply limited quantities to evaluate effectiveness and pollutant potential.

### **BMP Activities:**

- Develop sanding routes to be followed during ice and snow events, including frequencies and priority routes.
- Develop, review, and maintain an ice and snow removal plan manual.
- Designate bridges, overpasses, and streets to receive CMA under the pilot program.
- Inspect and pre-service the sanders in the fall.
- Stockpile traction sand at the Roosevelt Yard Maintenance facility.

- Ensure that a sufficient amount of trained sander operators are available.
- Activate the Emergency Command Center (ECC) at the Roosevelt Yard as necessary during ice and snow events.
- Apply sand to roadways in accordance with the ice and snow removal plan.
- Apply CMA to designated infrastructure in anticipation of ice events.
- Evaluate CMA effectiveness and pollutant potential.
- As soon as practicable after the ice or snow event, remove the traction sand by street sweeping with air and/or broom sweepers.
- Dispose of the recovered sand at the Roosevelt Yard facility for later use as backfill for sewer and street excavation projects.

**Assessment Methods:**

- Document the quantities of sanding material applied and collected during each storm event.
- Document the number of curb miles sanded and collected during each storm event.
- Document findings related to improved sanding application and cleanup practices as well as for evaluation of new chemical de-icing products and technology.
- Sanding: Date, operator, equipment ID, quantity of sand used, total hours, weather condition, total miles, routes sanded
- Sweeping: Date, operator, hours, equipment ID, estimated yards recovered, date completed

## **P2 - Revise Comprehensive O&M Plans**

### **Responsible Department/Division:**

Public Works Maintenance Division and  
Parks and Open Space Division

### **BMP Contact:**

Maintenance Division Director  
Parks & Open Space Division Director

### **BMP Description:**

The City will continue ongoing review and, as needed, revision of O&M plans and practices for both new and existing public stormwater facilities, including both open (above ground) and below ground stormwater quality facilities. Effort will include review of other Public Works related operations and maintenance practices that may cause negative impacts to stormwater runoff. Additionally, the City will continue on-going review and evaluation of maintenance plans and operational practices for open drainage channels to maximize water quality and habitat benefits, provide necessary capacity for conveyance, and emphasize erosion prevention measures.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Presently the PW Maintenance Stormwater System O&M Manual is still under review by internal staff. Recent changes with key personnel and restructuring of the work sections has temporarily set back this effort. A continued goal of the manual update is to ensure that policies and current practices accurately reflect the full spectrum of operational services provided by the PW Maintenance Section. In addition it shall clearly outline jurisdictional boundaries and maintenance authorities between the Parks & Open Space and PW Maintenance Divisions conveyance systems.
- After completion of the draft update it will be circulated for review & input from the division stakeholders.
- POS Division natural resource staff continued to implement environmentally friendly channel maintenance practices as described in the Open Waterway Maintenance Plans. In conjunction with this, staff continued a program to evaluate the effectiveness of these maintenance efforts. This program provides for the simultaneous inspection of key choke points and areas of special concern during major storm events in order to document conveyance issues and the effectiveness of any revised and/or experimental maintenance practices.
- Natural resource staff continued experimenting with bio-engineering techniques to repair and stabilize failing channel banks. Techniques included: using geo-textile socks filled with blown-in rock/soil mix to armor the deep toe cuts of eroded banks (replanted with willow and other native vegetation); laying back channel banks to reduce the possibility of bank sloughing and rotational slumping (replanted with native grasses and shrubs); and modified channel bank mowing practices to allow the growth of larger species of native vegetation whose root system will help hold banks in place and provide natural armoring against erosion.

### **Background:**

The City's NPDES permit requires preventing to the maximum extent practicable the discharge of anything except stormwater into local receiving waters. Stormwater System Operations and Maintenance (O&M) plans are key to realizing this objective. Through continuing analyses,

reviews, and updates, staff can ensure that the latest and best technologies, methods, design, and equipment are employed in maximizing water quality and enhancing natural resources and habitats. The O&M plans are drafted utilizing input from all staff, including field operations personnel, and are then reviewed and approved by the O&M Review Team. The O&M plans address internal stormwater maintenance policies, erosion control practices, practices related to right-of-way, wastewater system, and utility management as well as procedures related to open channel maintenance and construction.

**BMP Activities:**

- Finalize draft of Public Works Maintenance Division Stormwater System O&M Manual.
- Continual research by staff of new stormwater treatment technology, products, and facilities.
- Continual review of stormwater BMPs to ensure maximum effectiveness and efficiency.
- O&M Review Team meetings on an as needed basis.
- Insure that regular review of plans is completed by operations staff.
- Review and update of the Stormwater System O&M Manual on an annual basis at minimum.
- Field monitoring of open waterway performance during significant storm events.
- Review and evaluation of Open Waterway Maintenance plans on an annual basis based on field observations and evaluation of effectiveness.
- Develop maintenance objectives and standards for publicly maintained stormwater quality facilities.
- Ensure that structures and/or mechanisms are in place to enable sampling, testing and evaluating effectiveness of representative water quality facilities.

**Assessment Methods:**

- Document changes to operations and maintenance practices and their effectiveness as they relate to specific stormwater facilities and BMPs.
- Finalize draft Stormwater System O&M Manual.
- Review the Stormwater System O&M Manual on an annual basis, revise as necessary, and track distribution of such revisions department-wide
- Document revisions to Open Waterway Maintenance Plans
- On-going review of all stormwater related operations and maintenance plans and procedures.

### **P3 - Tree Planting and Urban Forest Enhancement**

**Responsible Department/Division:**

Public Works / Parks and Open Space Division

**BMP Contact:**

Parks & Open Space Division Director

**BMP Description:**

Continue to support government and community tree planting programs and to provide public information related to the multiple benefits trees provide for stormwater quality.

**Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Urban Forestry continued its partnership with the Eugene Tree Foundation (ETF) in its Legacy Tree Program. Several Legacy Tree Program web pages were developed and posted during this reporting period to ETF's homepage ([www.eugenetreefoundation.org](http://www.eugenetreefoundation.org)). The new pages explain the mission of the program and, with photos and text, give descriptions of each tree designated as a Legacy Tree to date.
- In its third year, the Tree Stewards volunteer tree care project continued the partnership between the City's NeighborWoods program and ETF to perform crucial structural pruning of newly-established trees. Another group of citizen volunteers will be trained this coming year in the basics of tree biology and identification, pruning techniques and safety. The number of Tree Steward Volunteers was 56. Volunteers put in 232 hours in pruning work. Over 200 trees were pruned during 8 projects.
- Urban Forestry staff continued work on an ArcGIS-based tree inventory system using staff and temporary workers for collecting data using a GPS hand-held computer and PDAs. Inventory data were collected in all new developments that were planted under the Developer Street Tree Program. Information about street trees in Eugene's downtown core and in some University neighborhoods was also collected. Over 40,000 trees and planting sites have been inventoried, including all trees pruned during Tree Steward pruning work parties and trees planted along stream corridors for future reporting on water temperature effects of shade cover along streams maintained by the City. At least two different neighborhood associations received information and presentation on the results of tree inventory data collection in their area, including discussion of the benefits of trees, such as reduction of storm water peak flows. The Urban Forester gave a powerpoint presentation to the City Budget Committee using slides developed by the Center for Urban Forestry Research at the University of California at Davis; the presentation gave results of a cost/benefit analysis of street trees and included information on the storm water quality benefits of tree planting. Urban Forestry staff were invited speakers at the annual conference in Corvallis, Oregon, of the Pacific Northwest Chapter of the International Society of Arboriculture. Two presentations were made on the use of the City's GIS-based tree inventory system. Information was included on the benefits of planting trees for water quality purposes.
- Councilors Alan Zelenka and Bonny Bettman helped kick off the City's Arbor Day celebration by accepting Eugene's 28<sup>th</sup> consecutive Tree City USA award from the Oregon Department of Forestry. Community members and volunteers from the Boy Scouts and Eugene Tree Foundation planted more than 20 trees in areas where the City of Eugene had removed more than 51 linear feet of sidewalk on 16<sup>th</sup> Avenue from Olive to Oak streets in this Trees for Concrete project.

- City Parks Planning staff sponsor public workshops for community input on park development projects. Staff help educate neighborhood groups on the storm water benefits of trees and developing designs that protect existing trees in an effective way. Urban Forestry staff assisted Public Works Engineering staff in facilitating meetings of the Crest Drive Citizens group that crafted a context sensitive design solution for street improvements, inventorying thousands of right-of-way trees and reporting to the group on the potential impacts of proposed construction scenarios on trees. Discussion of the benefits of trees for storm water quality were an important component of the group's agenda. Public Works Engineering Division landscape architects oversaw the contractual planting of 191 trees on park property and 69 trees as part of the new federal courthouse transportation improvements.
- All Parks and Open Space supervisors attend various monthly neighborhood association meetings to represent the Division in answering questions about parks and trees, often presenting information in an informal way about the myriad environmental benefits of trees, including water quality enhancement.
- Urban Forestry staff coordinated with the Engineering Division to plant 9 trees related to project work.
- Administration and enforcement of the Developer Street Tree Program by Urban Forestry staff saw 812 trees planted in new subdivisions.
- The City's NeighborWoods Coordinator recorded 1600 volunteer hours logged by over 400 volunteers, who planted 510 trees at ten tree-planting projects and neighborhoods throughout the City, including three Trees for Concrete projects, where concrete was replaced with trees and open planting beds that can help reduce storm water runoff.
- The Urban Forester worked with Lane Transit District (LTD) authorities and Eugene Tree Foundation (ETF) board members in planting fourteen replacement street trees removed for construction related to the Bus Rapid Transit project in the Downtown Eugene segment. Plans for the remainder of the required mitigation plantings are being reviewed by ETF and the City, and trees will be planted on a minimum one-for-one replacement basis during the next planting season. Urban Forestry and Parks Maintenance staff also worked with LTD to assure safe, low-maintenance shrub and ground cover plantings for medians along this major transportation project.
- The Urban Forester collaborated with Public Works Maintenance, Parks Maintenance, and Natural Resources staff to review a draft tree planting plan to shade Amazon Creek. Draft recommendations were withheld during the Metro Waterways project, with which the City's plan is intended to dovetail, and costing information is being developed to be prepared for potential grant opportunities to accelerate planting plans.
- Natural Resources Maintenance staff worked with Urban Forestry, Stream Team and NeighborWoods staff and with volunteer groups and contractors to see native willows and dogwoods (cuttings) planted along Oxbow West, Nolan, Bertelsen Nature Park, Dragonfly Bend and Amazon Creek. Over 5,300 of these willow and dogwood "stakes" were planted. In addition, 280 overstory trees were planted on the banks and tops of banks along three waterways to help shade the streams to improve TMDLs for water temperature.



**Background:**

Trees are known to slow peak flow during storms and to absorb and hold large quantities of rain water, both in the above-ground mass and in the root systems. These characteristics can reduce erosive runoff and the first flush of oil contaminants from streets, stabilize soils, and buffer seasonal stream flows. Root systems have been found to effectively filter pollutants before reaching groundwater, especially related to landfills and bioswales. Trees offer many other environmental benefits such as air quality improvement, community ambiance, carbon sequestration, energy reduction, economic enhancement, and wildlife habitat. Additionally, trees in riparian areas along streams and open drainage channels provide shade, helping mitigate temperature increases in adjacent water.

**BMP Activities:**

- The City has several programs for tree planting, maintenance and education. Maintenance programs for the enhancement of the health of the urban forest include, where appropriate, offering one-for-one replacement of trees removed for health and hazard reasons. The City regulates new development to ensure that new subdivisions are fully planted with street trees. By policy, City-engineered street improvement projects require the addition of street trees in plantable spaces. The City supplies trees for NeighborWoods, a staff-coordinated volunteer program, which plants trees along streets, in parks and along streams and monitors the trees through establishment for three years.
- The City has received Tree City USA recognition for 27 consecutive years. The Tree City USA program, a national award given by the National Arbor Day Foundation, is based on quantifiable measures of a city's commitment to tree care and includes an educational component built around Arbor Day celebrations in the community.
- Urban Forestry's educational efforts include several forms of citizen education, such as giving information in person, by phone, by e-mail, through newsletters and in group settings such as presentations to civic, neighborhood and professional groups locally and throughout the Pacific Northwest region.
- The Urban Forestry web page keeps citizenry informed and up-to-date about City programs and allows for electronic correspondence with City staff.
- Urban Forestry staff use CITYgreen software to provide public education about the quantifiable benefits of canopy cover related to stormwater runoff reduction as well as stormwater and air quality improvements.
- Collaborate with open waterway management staff to develop and implement tree planting plans for riparian areas along all waterways under City maintenance jurisdiction.

**Assessment Methods:**

- Document the number of trees planted through the City's Urban Forest Programs, Engineering Division projects, park development and improvement projects, and volunteer efforts.
- Maintain Tree City USA status, which requires quantifiable and verifiable measures, such as: per capita spending on tree planting; maintenance and management activities; as well as Arbor Day and other educational efforts.
- Document City-wide educational efforts related to urban forest best management practices that provide benefits to stormwater runoff quantity and quality.
- Track the progress on development and implementation of riparian tree planting plans.

## **P4 - Public Landscape and Vegetation Management**

### **Responsible Department/Division:**

Public Works / Parks and Open Space Division

### **BMP Contact:**

Parks & Open Space Division Director

### **BMP Description:**

Continue to evaluate and revise as necessary landscape and vegetation management programs for publicly maintained parkland, right-of-way, wetland, drainage channels and other natural areas to identify planting designs and O&M practices which will further limit the discharge of pollutant-laden runoff from these sites, will enhance the shade potential of waterway riparian areas, and will promote wildlife habitat where appropriate.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Public Works Department staff continued to utilize the services of an in-house Natural Areas Restoration Supervisor to work with parks planners in preserving and incorporating natural areas in the design and construction of new or refurbished developed park land. In this same vein, the Natural Areas Restoration Supervisor has continued to assist engineering project designers, maintenance crews and volunteer groups in evaluating planting sites and selecting appropriate species of native vegetation to plant in new construction projects, developed parks, natural areas, and open drainage channels.
- Parks Maintenance staff continue to monitor a series of test plots to assess the suitability of differing grass species for turf grass applications, such as sports fields and lawn areas. Also, preliminary experiments have been carried out plant two grass species that have not been used in the Willamette Valley before, Turf Type Tall Fescue and Kentucky Blue Grass. Both of these species require less irrigation and less fertilization than the typically used Perennial Rye Grass and should help reduce the necessity for pesticide use to control invading weeds.
- Parks Maintenance staff continues work to expand implementation of its innovative no-spray tree well program to eliminate the bark rings around trees in public parks and the need for the herbicide applications that are necessary to maintain barked tree wells. Since mowing around trees must be done by hand to avoid damaging trees with large mechanized turf mowers, bark rings are employed to save time and resources. However, they still must be weeded, often with the use of pesticide. By using a mix of fine, low growing fescue grass in place of the bark, it may prove unnecessary to either mow or spray, thus reducing both maintenance costs and pesticide use. This new approach has been implemented successfully in four city parks thus far. The pilot program will be evaluated over the next few years, to further test the performance of the fine fescue. If this approach continues to be successful, the program will be expanded throughout the park system.
- Natural Resource Maintenance staff continued to coordinate with the City's Nuisance Vegetation Code inspector regarding delayed mowing of grass and other herbaceous vegetation along channels and around ponds and wetlands. This is to allow desirable native species the opportunity to go to seed rather than mowing them down early and allowing undesirable non-native species to take prominence.
- Both Parks and Natural Resource Maintenance staff continued to modify our existing

mowing, channel maintenance and horticultural practices to protect and promote rare or listed species in parks and along drainage channels and creeks.

- Natural Resource Maintenance staff continued to implement practices set forth in the Parks and Open Space Division's internally adopted *Open Waterway Maintenance Plans*. These plans recommend reducing levels of channel bank vegetation removal, increasing invasive species control practices and promoting the growth of native species. Plans are in effect for 33 separate channel segments on 13 different waterways covering a distance of almost 29 miles.
- Parks and Open Space Division staff continued to employ an integrated pest management policy in the maintenance of City parks, sports fields, landscaped planting areas, roadside vegetation, street median strips, natural areas, and riparian corridors that emphasizes using pest control actions that have the least environmental impact. Parks Maintenance staff also continued a policy of minimizing the frequency and quantity of fertilizer applications.
- As part of a policy directive to expand IPM practices City-wide, Natural Resource section staff continued development of a set of IPM guidelines for use by staff in all landscape maintenance related functions in the City. Natural Resource section staff also initiated meetings with operations staff from other departments and divisions of the City to both identify their specific landscape maintenance concerns and to educate them on the policy development process.
- In with other IPM practices the Parks and Open Space Division continued the pilot program for pesticide-free parks. Parks Maintenance staff chose five parks to be maintained without the use of pesticides during the one-year pilot program. It is hope the new program will be a showcase for the many alternate methods available to solve pest problems, such as flame weeding, hand weeding, and mulching. Parks Maintenance staff will monitor the effectiveness of the various alternative methods and evaluate the feasibility of expanding the number of sites included in the program.
- Natural Resource Maintenance staff developed posting guidelines for its herbicide application program and has recommended that these guidelines also apply to all Parks and Open Space Natural Resource section employees and the contractors that this section manages. The goal is to have consistency within the Parks and Open Space Division with respect to the "toxics right-to-know" issue.
- Natural Resource Maintenance staff expanded the practice of selective hand removal of obstructing vegetation along and within the City's major drainage channels. This is in lieu of using heavy mechanized equipment to mow and/or dig out channel bank vegetation. Water quality is better protected by not excavating herbaceous plants from the flow channel, by not stirring up sediments, and by not denuding channel slopes. This management technique helps retain habitat and, with time, will allow the growth of larger woody vegetation on the upper slopes of excavated drainage channels that will provide much needed shade. During this past permit year, 21,761 lineal feet of drainage channels were maintained in this fashion.
- During this past permit year, the City's Volunteer Program planted 280 native over-story trees along the banks of several major open waterways and several hundred more trees in one of the City's wetland areas. Parks and Open Space Division staff planted native trees and shrubs along the lower slopes of approximately 3,500 linear feet of open waterways.
- Natural Resource section staff continues to manage a native plant nursery within one of

the City parks. This past year staff consolidated native plant material from two locations to one to maximize efficiency. The native plant nursery is utilized primarily for the propagation and seed grow out. During this past permit year, the nursery managed over 7,000 plants representing 97 different species. Of these, 30 species were wet prairie forbs and grasses, 23 were riparian under-story forbs, 8 were riparian trees and shrubs, 29 were upland forbs and grasses, and 7 were upland tree and shrub species. Most of these plants were grown from seed, while some of the shrub species were grown from cuttings. The native species grown and cared for at the nurseries were planted locally by Parks and Natural Resource section staff, Stream Team volunteers, and local non-profit groups for a variety of natural area, stream, riverbank, and wetland restoration and enhancement projects.

**Background:**

Creative and thoughtful design and maintenance of parkland turf and shrub beds, landscaped areas around buildings, planted roadway median strips, and other right-of-way planting strips or areas can help reduce the volume of stormwater and irrigation runoff from these sites. It can also help eliminate the need for fertilizer and pesticide applications which can contribute pollutants to stormwater or irrigation runoff. Most often this can be accomplished by a combination of using native plants and incorporating Integrated Pest Management (IPM) principles into O&M practices.

Vegetation maintenance is necessary along many open drainage channels in order to provide adequate capacity for the conveyance of storm event runoff. However, bank side and top-of-slope vegetation also provides multiple benefits for stormwater quality, in stream temperature control and wildlife habitat. Developing and implementing O&M plans and practices that balance these objectives is an imprecise science that requires on-going monitoring and evaluation as well as the use of new, innovative and alternative field techniques and practices. As with developed landscaped sites, incorporating IPM principles into O&M practices will help reduce the possibility of local waters being contaminated with fertilizers and pesticides.

**BMP Activities:**

- Stormwater and natural resource concerns are primary criteria for staff from the City's Parks and Open Space, Facilities, and Engineering Divisions when developing designs for parks, shrub beds, street medians and planters, and other City maintained turf and landscape areas. Staff continue to research, evaluate and incorporate new stormwater and natural resource friendly landscape ideas into their designs in order to minimize impervious surface area runoff and maximize the benefits provided by native plants.
- The City of Eugene currently employs on-going IPM principles in all landscape and vegetation maintenance operations. This practice has proven very successful at reducing the use of pesticides and herbicides in developed parks, along roadsides, on undeveloped property, in wetland, and along open drainage channels. To formalize this, establish a policy for use by staff city-wide, regarding the City's use of fertilizers, pesticides and herbicides. Outreach to staff city-wide about the new policy.
- The City is continually looking for opportunities to use native and other "ecologically appropriate" vegetation in parks and other landscaped public areas. This also helps

reduce the need for fertilizers and other chemicals that many horticultural varieties of landscape material frequently require.

- The City continues to research new technology and techniques in landscape and vegetation maintenance that minimize the need for fertilizer and pesticides. Additionally, the City will continue to monitor new techniques, practices, and products which will minimize impacts to water quality and natural resource values in wetland, undeveloped parkland, and along open drainage channels. Modifications to existing vegetation maintenance practices and/or experimentation with new practices will be implemented where appropriate.
- The City has developed and begun implementing Open Waterway Maintenance Plans for a large number of open waterways under their maintenance jurisdiction. These plans attempt to achieve a balance between conveyance, water quality, and natural resource protection objectives. They emphasize using a selective approach to vegetation removal with a greater use of manual methods and using “greener” bio-engineering methods to help repair erosion and channel bank failure problems.

**Assessment Methods:**

- Track the implementation of new landscape or natural resource enhancement design ideas.
- Document modifications to existing landscape maintenance practices or procedures as well as monitor and evaluate their effectiveness.
- Track the quantities of pesticides, herbicides, and fertilizers used each year and compare with quantities used prior to the implementation of alternative practices and procedures.
- Document landscape design workshops and/or IPM training sessions held or attended.
- Document the number of miles of open waterway maintained using selective manual vegetation control methods.
- Amount of leaf compost City makes and how much is reapplied to City planting areas.
- Inventory of Native Plant Nursery salvage and grow-out species.
- Varieties and extent of native species planted on public projects.

### **3.4.5 Status of Illicit Discharge Control BMPs**

#### **M1 - Enforcement for Illicit Discharges**

**Responsible Department/Division:**

Public Works Maintenance Division

**BMP Contact:**

Maintenance Division Director

**BMP Description:**

The City will attempt to effectively discourage and reduce improper discharges into the stormwater system through continued operation of the existing stormwater discharge compliance enforcement program. The primary goals of this program are to protect the quality of the receiving waters of the City's stormwater system and to ensure that discharges to the City's stormwater system comply with local, state, and federal regulations to the maximum extent practicable. The City will continue to conduct periodic review of enforcement program practices and procedures and make revisions as deemed necessary.

**Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Working in conjunction with City of Springfield Environmental Services staff and City of Eugene Wastewater Industrial Source Control personnel to implement new "Fish Friendly" Car Wash Kits for local Non-Profit Fundraising. This was done by researching other municipal programs, putting together user friendly kits and inspecting sites for suitability. This program was funded through donations from the Sierra Club-Many Rivers Program.
- Public Works Maintenance-Spill Response Technical Specialist continues to work closely with staff of Public Works Engineering-Erosion Control Team and Public Works-Wastewater Industrial Source Control Technicians as an Enforcement Team with regular review meetings to discuss discharge, educational outreach, compliance and penalty issues.
- Enforcement referrals were made to Erosion and Wastewater Industrial Source Control for follow up.
- Program Technician spent over 40 hours in this year of review at Water Quality, IDDE and Pollution Control trainings put on by regional water agencies and a couple EPA webcasts.
- Enforcement program continues to use "Notice of Violation" letters, collect abatement costs and levy civil penalties as needed.
- Stormwater pollution educational Best Management Practices resource guides, stormwater system function and protection brochures, a copy of Illicit Discharge Regulations is provided to all violators as well as other businesses or citizens in a proactive approach.

**Background:**

Schedule A of the City's NPDES stormwater permit requires the City to: "Reduce the discharge of pollutants from the municipal separate storm sewer system to the maximum extent practicable" and to "effectively prohibit non-stormwater discharges into the Municipal Separate

Storm Sewer system unless such discharges are otherwise permitted by an existing...NPDES permit...” The term illicit discharge is defined in the City’s NPDES permit as “...any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to an existing NPDES permit and discharges resulting from emergency firefighting activities.”

To comply with NPDES requirements, the City of Eugene currently has extensive municipal code language prohibiting the discharge of any material other than stormwater into the public stormwater system unless permitted by the state. In addition to the code language, the City has an Administrative Order which establishes mechanisms for issuing a civil penalty when a responsible party is in violation of the City code. To support the City code a Stormwater Investigation and Enforcement Program has been established.

The primary goals of the stormwater pollution enforcement program are to:

- 1) Protect the City’s receiving waters quality;
- 2) Ensure that discharges to the City stormwater system are in compliance with local, state, and federal regulations; and
- 3) Comply with requirements of the City’s NPDES permit.

The primary objectives of the enforcement program are to:

- a) Discourage violations of stormwater regulations through enforcement action;
- b) Provide an effective and safe stormwater system for the public and City staff;
- c) Protect the City’s stormwater infrastructure; and
- d) Reduce flooding or infrastructure failure resulting from illicit discharges to the system.

#### **BMP Activities:**

- Follow the guidelines established in the Stormwater Investigation and Enforcement Manual (Updated August, 2002).
- Receive improper discharge complaint from property owner, concerned citizen, City staff, other agencies, etc.
- Respond to the complaint site and make initial assessment.
- Determine if the discharge material is hazardous, non-hazardous, or unknown. If the material is hazardous or unknown call for the Eugene Fire Department Hazmat Team or a hazardous material mitigation contractor.
- Complete information will be gathered by PWM response personnel, including photographs, and entered into the “Cassworks” database.
- The source of the prohibited discharge will be determined and eliminated if possible.
- A responsible party will be determined if possible.
- If a source and responsible party are identified, efforts will be made to obtain voluntary cooperation from the party by eliminating this, and any future, discharge occurrences, and to clean up the discharge material from private and public property.
- The responsible party will be given educational materials concerning the storm sewer system and discharge requirements.
- PWM staff will determine if a discharge violation has occurred.

- If a violation has occurred, the responsible party will be sent a courtesy letter or Notice of Violation providing more information on possible impacts of repeated violations, as well as suggestions for compliance with established stormwater discharge codes.
- If a point source is not identified or if a responsible party can not be established, PWM will commence clean-up actions on public property and isolate the discharging material from the public stormwater system.
- All actions, impacts, and results will be entered into the “Cassworks” MMI system.
- Any abatement cost recovery and/or penalty will be determined after a review of site-specific conditions, actions and past history.

#### **Assessment Methods:**

- For noted violations, the City will take appropriate enforcement actions to correct the problems and discourage repeat violations.
- To assess program effectiveness, total violations and repeat violations will be tracked over time. Program practices will be adjusted as necessary to achieve the desired results.
- Number of spills or discharge complaints reported or received
- Site visits conducted
- Investigation hours
- Discharged material identifications
- Responsible party tracking
- Tracking of information requests
- Notice of Violations issued
- Letters sent out (warnings, educational, code information )
- Abatement costs billings
- Civil penalties assessed



## **M2 - Environmental Spill Response Team**

**Responsible Department/Division:**  
Public Works Maintenance Division

**BMP Contact:**  
Maintenance Division Director

### **BMP Description:**

Maintain an on-call team trained in spill response procedures involving environmentally hazardous materials and a vehicle equipped for such spill mitigation. Coordinate efforts with other local response teams such as the City of Eugene Fire and Police Departments, Lane County, and state agencies.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Program Technician is doing ongoing product application for different types of non-painted type storm drain markings for public education and outreach. Testing is for durability, visual appeal, ease of application and of course content of message.
- All catchbasins have been marked in the City of Eugene Roosevelt Yard facility and Downtown Parks Blocks event areas with glued down plastic or metal “No Dumping drains to waterways” placards.
- Spill Response staff continue to work closely with Stormwater Vacuum Truck Crews, Street Sweeper Operators, Parks and Open Space Staff, Wastewater Industrial Source Control Technicians to identify, investigate and abate Illicit Discharges and Spills.
- Continued to respond to spills with City Maintenance Staff, City Emergency Services Personnel, other government agencies and hired contractor NorthWest Hazmat Inc. as needed.
- Provided annual 4 hour Hazardous Materials First Response refresher training for 49 City personnel.
- City Spill Program-Technical Specialist provided Municipal Storm Water Pollution Prevention training for all Public Works Maintenance and Parks and Open Space field staffers through the incorporation of a published Storm Watch DVD and lecture on IDDE and Stormwater Best Management Practices.
- IDDE, Spill Prevention and Construction related BMP’s presentation was made to all City Engineering Construction Inspectors to improve compliance on contracted city project work.
- Trained 26 additional staff as new Hazardous Materials First Responders.
- Polk Street Stormwater Vault continues to regularly monitored, maintained and cleaned through the use of 6 oil absorbent boom sets and confined space entry by staff to use vacuum truck to remove trapped floatables and solids.
- Continued and expanded cooperative relationship, regular meetings and networking with City of Springfield Environmental Services staffers.
- Primary and back-up program personnel are getting ongoing training to maintain their 40 hour Hazwoper Certifications

### **Background:**

Schedule A of the City of Eugene’s NPDES permit requires the City to: “Reduce the discharge of pollutants from the municipal separate storm sewer system to the maximum extent practicable” and to “effectively prohibit non-stormwater discharges into the Municipal Separate

Storm Sewer system unless such discharges are otherwise permitted by an existing...NPDES permit..." The term illicit discharge is defined in the City's NPDES permit as "...any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to an existing NPDES permit and discharges resulting from firefighting activities."

The City's Public Works Department is responsible for protecting the City's infrastructure and drainage ways from environmentally harmful spills and discharges. Quite often, Public Works staff is the first to discover discharges of materials that present a threat to the environment. Frequently the discharged or dumped material has entered or has the immediate potential to enter the piped stormwater system or an open drainage way. Trained staff respond to spills of minor magnitude as a matter of routine operations and maintenance procedures.

To be prepared for a large, potentially damaging spill, the Department's Maintenance Division keeps a team of twenty to thirty staff members trained in emergency spill response and clean-up. All work teams within the Division are represented, providing the Department with a pool of trained and variously skilled staff that might prove necessary in the event of a major spill or other environmentally threatening situation. Trained on-call personnel include operators of equipment such as jet/vacuum machines, street sweepers, back-hoes, and hydraulic excavators as well as a team of Public Works supervisors trained in the Incident Command system.

The Public Works Department will continue to provide necessary and appropriate training to staff in both defensive hazardous materials response and in the mitigation of environmentally threatening spills. However, Public Works staff will not normally perform mitigation of spills where respiratory protection and/or self-contained breathing apparatus are required. The State Region 2 Hazmat Team, staffed by the Eugene Fire Department, will continue to take lead in these situations. Public Works will continue to equip, maintain, and periodically upgrade a vehicle for the express purpose of spill response in the urban area. Additionally, staff will continue to coordinate response procedures with other local agencies and participate in area emergency response drills when appropriate.

#### **BMP Activities:**

- Identify and provide training for those Public Works Maintenance positions which could be reasonably expected to encounter and/or participate in emergency spill response and/or clean-up activities.
- Maintain an employee listing of those trained in Hazmat First Response.
- Provide 16-hour First Responder training and 40-hour Hazmat Responder training for the appropriate positions.
- Provide Incident Command System training for all PWM Supervisors.
- Participate in table top exercises and drills with other local agencies.
- Equip all PWM vehicles with copies of the current version of the US DOT Emergency Response Guidebook.
- The PWM Spill Response Technical Specialist will maintain the spill response vehicle with an adequate supply of spill response materials and equipment.
- If the PWM employee is the first on the scene of a spill or discharge potentially hazardous to the environment, he/she will assume Incident Command until relieved by a

higher authority. This will include isolating the area if possible, or keeping the public away from the area.

- Eugene Police and Fire dispatch will be notified in the event of a potential hazard and will assume Incident Command upon arrival at the site.
- PWM staff will assist in clean up at the direction of IC, or when IC has been transferred back to Public Works.
- Assist the Eugene Police Dept. (EPD) and the Eugene Fire Dept. (EPD) with vehicle accident clean-up.

**Assessment Methods:**

- Record number of spills or discharge complaints reported or received
- Track number of information requests
- Track number of site visits conducted
- Track discharged material information
- Track warning letters, notice of violations, abatement costs, and penalties assessed.
- To assess program effectiveness, total violations and repeat violations will be tracked over time. Program practices will be adjusted as necessary to achieve the desired results.
- For noted violations, the City will take appropriate enforcement actions to correct the problems and discourage repeat violations.

### **M3 - Litter and Illegal Dumping Programs**

**Responsible Department/Division:**

Public Works Maintenance Division and  
Parks and Open Space Division

**BMP Contact:**

Maintenance Division Director  
Parks & Open Space Division Director

**BMP Description:**

Continue existing program of providing and maintaining trash receptacles in strategic publicly owned sites and in providing trash receptacles and collecting litter during major public events. Continue existing program of systematic inspection for and as-needed clean up of illegal dump sites. Conduct on-going evaluation of programs, monitor trends in litter and illegal dumping practices, and revise and/or expand programs as necessary and appropriate.

**Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Monitored 472 outdoor public events, provided trash and litter collection, and worked with event management staff to reduce the impacts of litter to the storm water system.
- Used the Public Works weekend supervisor position to investigate and mitigate litter and trash disposal problems during park and community events.
- Employed parks maintenance staff and seasonal employees to provide seven-day-a-week coverage for litter patrol and trash pickup, including a two-person crew to patrol the river corridor two or three times a week and to clean up illegal campsites.
- Used parks maintenance staff and seasonal employees to inspect the City's open waterways and to remove litter and trash.
- The Stream Team and Volunteers in Parks volunteer coordinators conducted numerous work parties whose tasks included or consisted solely in removing litter and trash from the river corridor and from ponds, wetlands, and open drainage channels that are the City's maintenance responsibility. The City sponsored and provided logistical support for a Willamette River cleanup project in June 2007, in which volunteers collected approximately 15 cubic yards of trash and litter from the river and its banks.
- Used a flat-bottom motorboat to inspect islands in the Willamette River and hard-to-access sections of river bank for illegal dumpsites and illegal campsites.
- Utilized a Sheriff's adult work crew on weekends to supplement the efforts of City parks maintenance staff in collecting litter and trash in the river corridor and in cleaning up illegal campsites along the river corridor and major drainage channels. The Sheriff's crew collected over 200 cubic yards of litter and trash, including 526 syringes. City staff collected over 127 cubic yards of litter and trash, including 578 syringes.
- Utilized a Sheriff's adult work crew to remove litter, trash, and debris from minor drainage channels and ditches.
- Used both parks maintenance staff and the Sheriff's adult work crew to remove blackberry vines in the river corridor and in areas along major drainage channels where illegal camping is popular to eliminate the concealment that illegal campers seek out in an effort to discourage illegal camping and reduce the amount of trash associated with that activity.
- Continued to look for strategic locations for public litter receptacles in parks and near open waterways.

**Background:**

Primary goals of the program are to keep litter and trash contaminants from entering the stormwater piped conveyance system, open waterways and wetlands areas of the community. In addition, this task is done to create a cleaner and healthier urban environment for the citizenry that uses the public areas of the community.

**BMP Activities:**

- Litter in City Parks is picked up and trash receptacles are emptied seven days a week.
- When reservations are made for park facilities, a clean-up deposit fee is collected in advance.
- Trash receptacles and collection are provided for all the City-sponsored outdoor public events in parks, on public streets, or on other public property.
- City currently picks up litter and empties trash receptacles from selected commercial areas, parking lots and garages, and the pedestrian mall on a daily basis.
- Litter on streets is removed by street sweeping activities and frequency is based on street designation and traffic use.
- All litter and trash swept from streets and alleys is sorted and recyclable material is removed with remaining debris disposed in a landfill.
- Major drainage channels are inspected weekly and illegally dumped debris and garbage is removed and recycled when possible with any remaining material being disposed in a landfill.
- Specific sites along open waterways or dead end streets that are frequently used for illegal dumping or homeless camping have been identified and are monitored and cleaned up on a regular schedule. The City attempts to identify the responsible party and then removes the debris as soon as possible so as to discourage additional dumping or camping.
- City streets, alleys, and bike paths are systematically inspected and cleaned on a routine schedule. Inspection frequency is determined by historic illegal dumping activity and by established sweeping routes.
- City responds to reports from the public, notification from sweeper operators or other City maintenance staff of debris dumped on sidewalks, alleys, open waterways and any other public areas.

**Assessment Methods:**

- Document the number and placement of new trash receptacles and litter picked up as well as the number of outdoor public events where trash receptacles and litter collection is provided.
- Document the location and quantity of illegally dumped debris picked up and removed from public rights-of-way, parks, drainage channels, roadside ditches, creeks and rivers by POS staff and by the County Sheriff's work crew. (This includes the number of syringes and other biohazards collected.)
- When available, data include the quantities of litter and dumped debris that is removed by volunteer program efforts.

## **M7 - Systematic Field Investigation for Improper Discharges**

**Responsible Department/Division:**  
Public Works Maintenance Division

**BMP Contact:**  
Maintenance Division Director

### **BMP Description:**

Using a watershed basin approach, the City will systematically inspect all private commercial/industrial stormwater systems that connect to the public drainage system. The purpose of this is to map private systems where no records currently exist and to assess the impacts of the private system on the public system. Where evidence is found that significant levels of pollutants are being introduced to the public system, City staff will work with property owners to correct the problems causing the discharge of pollutants.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- The Systematic Field Investigation (SFI) position continues to provide inspections of public catch basin structures for deteriorated bottoms which need to be replaced. Implementation of a replacement program for bottomless catch basins is currently in place. These structures are placed on a capital improvement project list for replacement. In addition, the SFI position continues to document any mapping errors and investigates improper connections or any structural problems found during inspections by the stormwater operations crew.
- Continuing investigating conveyance problems such as utility breaches, grout build up, off-set joints, cracks and roots that Closed Circuit Television inspections capture.
- Working in conjunction with Pavement Preservation projects to identify conveyance problems prior to new road surfacing.
- Inspected and abated 170 sites of illegal dumping in the right of way (ROW).
- Recorded 78 stormwater map corrections.

### **Background:**

The Systematic Field Investigation (SFI) program was developed to confirm the configuration of the municipal stormwater system and map private connections which have not previously been recorded. In addition, the SFI program identifies and removes sources of pollutants found to be entering the public stormwater system. Once identified significant sites are tracked which may adversely impact the municipal system. Furthermore, additional investigation and follow-up is conducted on systems where evidence exists that pollutants are entering the stormwater system. When a pollutant source is found, steps are taken to prevent further discharge to the system.

### **BMP Activities:**

- City staff will continue a regular pipe system inspection program (systematic field investigation) for potentially high source land uses (i.e. commercial and industrial areas) to detect and identify sites that have obvious potential for illicit discharges.
- Re-evaluate the focus and emphasis of the Systematic Field Investigation program and follow up procedures based on lessons learned over the past 10 years, and new equipment available at Wastewater Treatment Plant lab. Refine program objectives.
- City staff will document the configuration of private systems where no records currently exist. These records will be entered into the City's Geographic Information System.

- During the inspection, City staff may contact a representative of the property and provide the current tenant of the property educational information on stormwater regulations and best management practices.
- If a significant source of pollutants is found, inspection staff will refer the site to the appropriate City staff for follow-up.
- Where problems can not be corrected through voluntary cooperation, code enforcement procedures will be employed which may include notices of violation, penalties, fines, abatement action, and/or referral to state agencies.

**Assessment Methods**

- Record number of sites inspected
- Record number of map corrections developed
- Assessment will be based on the number of sites inspected, the number of problems noted by staff, and the level of compliance achieved through voluntary means. Refinements and/or adjustments to the program will be made as needed.

### **3.4.6 Status of Waste Management BMPs**

#### **B1 - Household Hazardous Waste Disposal**

**Responsible Department/Division:**  
Planning and Development /  
Building and Permit Services Division

**BMP Contact:**  
Building and Permit Services  
Division Director

#### **BMP Description:**

Continue to support existing efforts and programs within the Eugene metro area to inform citizens of local opportunities for the proper discard and disposal of their household hazardous waste materials. Continue efforts to support and promote facilities and programs that provide such opportunities.

#### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Feature article in Spring, 2007 Stormwater Connections was “Are You Paint Savvy” Paint calculator, paint disposal, what is paint waste, who to call.
- Lane County Home Show (spring, 2007), featured paint waste and how to best manage it as the theme of Program’s booth.
- Fall 2006 Stormwater Connections article was “Lethal Liquids” and addressed motor oils, antifreeze, hydraulic fluids, how to manage clean ups, etc.
- Renewed contract for “brown pages” in regional telephone directory to inform residents about proper disposal of household hazardous waste.
- Staff distributed “builder’s map” to guide builders to locations accepting hazardous waste for proper disposal.

#### **Background:**

The improper disposal of household hazardous waste poses a serious threat to local stormwater quality. Old paint, solvents and thinners, pesticides, bleach, drain cleaners, antifreeze, gasoline, used motor oil and other motor vehicle fluids can easily be flushed into the stormwater system if disposed of in yards, left uncovered in the rain, or poured down driveways or into the street. Supporting efforts to inform homeowners and tenants about where they can properly dispose of these products as well as supporting local household hazardous waste management facilities and efforts is an effective way to reduce the amount of these products that inadvertently make their way into the stormwater system and local receiving waters.

#### **BMP Activities:**

- Continue to collaborate with Lane County Waste Management Division staff on educational outreach via the development and distribution of brochures, fact sheets, and community outreach events.
- Work with Lane County to assess whether and how we can gather data on and report on what is done under the auspices of Lane County’s Household Hazardous Waste Program.
- Continue participation in interagency pollution prevention group. Current grant application requests DEQ funding for a Household Hazardous Waste Educational



Outreach Program. With approved funding, group will focus on hazardous waste prevention with painting, gardening and cleaning products and practices.

- Continue to require solid waste haulers to notify their customers of the Special Wastes Program offered through the Lane County Waste Management Division.
- In conjunction with ED1 (Stormwater Education), develop a paint outreach campaign that informs both professional painters and citizens about handling and care of paint and associated products.
- Work with local paint businesses to display and provide educational posters and fact sheets.
- Maintain a City website page that provides education on household hazardous waste and explains how to set up an appointment with Lane County Solid Waste to dispose of materials properly.
- Continue collaboration with local metro area partners to publish information in local phone books regarding waste prevention, recycling, composting, and disposal of household hazardous waste.

**Assessment Methods:**

- Document materials disbursed about household hazardous materials.
- Document participating businesses in “paint outreach” campaign and publications produced and distributed.
- Conduct survey to assess community knowledge of household hazardous waste program.

## **B2 - Solid Waste Management**

**Responsible Department/Division:**  
Planning and Development /  
Building and Permit Services Division

**BMP Contact:**  
Building and Permit Services  
Division Director

### **BMP Description:**

Continue to evaluate and revise, as necessary, existing solid waste and recycling collection rules to address stormwater quality.

### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Collection fees remained constant; no fee increases during reporting period. However, as of this writing, Lane County has a disposal rate increase proposal ready for County Commission review, and Eugene is in the latter part of a rate review.
- Commingled recycling collection service is offered to commercial sector customers.
- State of Oregon continues to work on rulemaking process to guide commercial composting facilities.
- City distributes “Builders Map” for construction and demolition debris recycling. Renews contract with Dex Media for informational “brown pages” in regional telephone directory.
- 12,464 tons of yard debris are collected during calendar year 2006, a minor increase over the 2005 collected volume.
- 110,652 tons of garbage collected from commercial and residential sources during calendar year 2006, approximately a ten percent increase over 2005 levels.
- 2007 Oregon legislature passes two important bills. One, related to electronic discards and disposal (banning computer monitors from landfill), and the other, an expansion of Oregon’s bottle bill to include water bottles.
- Eugene fulfills Oregon DEQ requirements related to “Opportunity to Recycle”, which provides for educational and service standards.
- Eugene secures EPA Resource Conservation Challenge Grant “Going for the Gold in Zero Waste Events”.

### **Background:**

Improper and/or unregulated collection and recycling of solid waste has a serious potential for creating negative impacts to stormwater quality. High collection fees, infrequent or spotty collection service may lead to illegal dumping activity. Unregulated waste containers may be prone to leaking or spilling allowing pollutants to wash into the storm system. By continuing to monitor and evaluate local solid waste management collection efforts, the City will be better able to improve local regulations so that stormwater quality is taken into account.

### **BMP Activities:**

- Continue to regulate solid waste and recycling collection activities within the city limits. Each collector is required to obtain a business license from the Planning and Development Department. The City also sets collection rates and standards but does not limit collection service providers to a specific geographic demarcation, or territory. Collection service providers are required to supply separate carts for garbage, yard debris

and recycling which are designed and built to limit effluent impacts to the stormwater system.

- Eugene residents may contract with a provider for waste collection service or transport their own solid waste to a Lane County transfer station. The vast majority of residents and businesses subscribe to a collection service with only a small percentage utilizing a “self haul” approach.
- Continue to revise and enforce collection standards that reflect local goals and state of Oregon mandates, notably the 1991 Oregon Recycling Act. All solid waste collectors must transport waste and recyclables in a way that minimizes odor and keeps materials from dropping, spilling, or blowing from the vehicle. Curbside residential recycling must be provided weekly, with a rigid container for recyclables, and haulers are required to provide recycling information to both residential and commercial customers.
- Continue to support a minimum of biweekly collection service for organic materials and to provide backyard composting classes for those residents without collection service.
- Continue to support pilot project efforts such as allowing food waste to be combined with other organic yard debris collection.
- Continue to implement a nuisance abatement enforcement program that provides rapid response to illegal dumping of garbage, yard debris, or other solid wastes materials.
- Continue to monitor state regulations relating to composting facilities and the proper management of stormwater runoff from these facilities.

#### **Assessment Methods:**

- Document planning and coordination activities.
- Report on implementation of commercial and residential recycling programs.
- Report on legal authority reviews and lobbying efforts.
- Document associated educational efforts.
- Track implementation and effectiveness of pilot programs and/or revised collection practices.
- Yard debris volumes.
- Garbage volumes.

### **3.4.7 Status of Industrial Control BMP**

#### **W2 - Industrial Stormwater Management Program**

**Responsible Department/Division:**  
Public Works / Wastewater Division

**BMP Contact:**  
Wastewater Division Director

#### **BMP Description:**

Continue providing oversight of stormwater discharges and washing activities from industrial facilities, screening new businesses for those that may require NPDES Permits, conducting inspections and providing technical assistance to industries with NPDES Permits, and responding to spills at facilities with permits.

#### **Year 4 Accomplishments (July 1, 2006 – June 30, 2007):**

- Currently there are fifty-four active 1200Z NPDES general stormwater permits and ten active 1700A NPDES (wash water) permits.
- During this reporting period, no new 1200Z NPDES permit were issued and three 1200Z NPDES permits were terminated, KMF Research, Martin Brother Signs and Williams Bakery. No new 1700A NPDES permits were issued and one permit was terminated, Quality Mobil Wash.
- Three sites were evaluated and approved for No Exposure Certification status. University of Oregon, Laidlaw Transit and Express USA. One site, Northwest Web was denied and is currently in the process of obtaining a General 1200Z NPDES permit. Currently eleven approved No Exposure Certifications are on file.
- Fifty-four 1200Z permit renewal applications were reviewed for completeness and copies forwarded to DEQ for their records.
- Forty-five revised Stormwater Pollution Control Plans were reviewed. Updated plans are required as part of the process of issuing new 1200Z NPDES permits. The new 1200Z NPDES permits due to be issue after the first of 2008.
- One new Stormwater Pollution Control Plan from Northwest Web was reviewed and approved.
- Sixteen permitted 1200Z NPDES facilities exceeded fifty-two benchmark parameters. Total Zinc (22), Total Suspended Solids (21), Total Copper (5), Oil and Grease (2), pH (1), e-Coli (1).
- Currently forty-two 1200Z NPDES permittees have initiated monitoring reduction waivers. Waivers are allowed for individual benchmarks once four consecutive monitoring results achieve benchmark over a two year period.
- One Notice of Violation Letters was issued to Northwest Web for site practices (paper dust) which were impacting their stormwater runoff. Northwest Web is currently in the process of obtaining a General 1200Z NPDES permit.
- Request For Corrective Action letters were issued to nineteen 1200Z NPDES and five 1700A NPDES permittees for the and following permit violations:

#### 1200Z permittees

- 17 ~ late submittal of annual Discharge Monitoring Report.
- 3 ~ failed to monitor pH as required by 40 CFR, Part 136.
- 1 ~ failed to monitor for all benchmark parameters.

#### 1700A permittees

- 1 ~ failed to submit 2<sup>nd</sup> quarter 2006 Discharge Monitoring Report.
- 1 ~ exceeded (83 mg/l) TSS benchmark (60 mg/l).
- 1 ~ violated (5.1) pH limitation by more than 0.5 pH.
- 1 ~ failed to conduct all required self-monitoring parameters.
- 1 ~ failed to conduct self-monitoring requirements.

- Notification of Requirements letters were issued to nine businesses in response to their washing activities.
- Seven site visits were conducted at 1200Z NPDES facilities during FY 06-07, Hearin Forest Industries, Pacific Recycling, Williams Bakery, Pennington Crossarms, Oregon Ice Cream, University of Oregon, The Truss Company.
- Eight complaint driven site visits were conducted at Oregon Taxi, Apartments @ 4675 Goodpasture Island Rd. Pacific Recycling, Kowloon's, Hertz car service, Kendal Subaru, Specialty Automotive, and Rexus.
- Four sites were evaluated for No Exposure Certification status. University of Oregon, Northwest Web, Laidlaw Transit and Express USA.

#### **Background:**

The Industrial Stormwater program objectives are to minimize to the maximum extent practicable the discharge of pollutants from industrial facilities with NPDES permits to the City stormwater drainage system. Program objectives are accomplished by ensuring that appropriate industries have obtained an NPDES permit and are complying with permit requirements. City staff continues to evaluate new and existing businesses to determine if an industry requires an NPDES permit. Inspections of these industries are conducted by the City to determine whether a permit is needed. Industries requiring an NPDES permit are notified by the City. The City reviews permit application for completeness and forwards appropriate documentation to DEQ who issues the permit. Stormwater Pollution Control Plans are submitted to the City for review. Plans are returned to the industry with comments when incomplete. Staff obtain, review and track industry self monitoring data and maintain a data base of benchmark exceedances. Chronic problems may result in inspection which is coordinated with the DEQ. Failures to comply with NPDES permit conditions or to obtain a permit as required by the DEQ are referred to the DEQ for enforcement. Staff will notify industries of the requirement to review and modify their SWPCP plan when benchmark exceedances occur. Sampling of industries may be conducted in relation to chronic exceedances of benchmarks, complaints, or implementation of the reduction in monitoring option. The City responds to complaints concerning illegal discharges or spills at industries with NPDES stormwater permits and takes appropriate enforcement action under City code for the discharge of materials not authorized under a NPDES permit.

#### **BMP Activities:**

- Manage 1200Z and 1700A NPDES permit files

- Evaluate new and existing facilities for requiring NPDES permits
- Determine permit compliance with existing NPDES permitted facilities.
- Evaluate SWPCP completeness and update requirements.
- Review annual Discharge Monitoring Reports for permit compliance.
- Maintain data base of Discharge Monitoring Report data.
- Issue Request for Corrective Action letters for permit noncompliance.
- Initiate enforcement referrals to DEQ for ongoing noncompliance issues.
- Conduct site inspections at existing and potential NPDES facilities.
- Conduct periodic monitoring for compliance determination.
- Provide technical assistance to permitted facilities.

**Assessment Methods:**

- Track current number of active and terminated 1200Z and 1700A NPDES permits.
- Track current revision of Stormwater Pollution Control Plans and industry self-monitoring data.
- Maintain lists of benchmark exceedances and identify chronic problems for follow-up activities or referral to DEQ.
- Track current number of monitoring reduction waivers and qualifying parameters.
- Maintain spreadsheet of Request for Corrective Action letter issued.
- Track number of site visits and inspections conducted at NPDES facilities.

### **3.4.8 Summary of Educational Products Available**

#### **PERMIT YEAR 4 (July 1, 2006 – June 30, 2007)**

##### Activities:

- Created booth at Lane County Home & Garden Show. Theme: “Smart Painting Tips” (March 2007)
- Created booth at Good Earth Home Show. Theme: Earth-Friendly Programs (January 2007)
- Public Works Day – Stormwater 3-D game maze. (May 2007)
- Earth Day Celebration Booth. Theme: Smart Painting tips (April 2007)
- Created display for new venue: Sustainable Sunday at Lane County Fair. Information booth that included stormwater program handouts along with other sustainable programs managed by the City of Eugene. (August 2006)

##### Brochures & handouts:

- Customer Notification, Stormwater and Wastewater, Residential & Commercial (June 2007)
- Convert cover page articles from stormwater newsletter into handouts.
- Add companion insert in paint waste brochure

Collaborative project: Staff from cities of Eugene & Springfield put together car wash kits for non-profit fundraising groups with handouts, instructional information on how to use kits & signage board with “Fish-friendly car wash kit” wording along with city logos.

Newsletters: 2 issues of Stormwater Connections (April 2007, November 2006)

Presentations: Classroom presentations to local schools.

School curriculum: Continue to promote SPLASH & salmon curriculum for area schools, for grades K - 12. Notebooks provided to teachers with lessons, activities and handouts. Several teacher workshops were offered.

SPLASH CD: Continue to include songs for children about clean rivers, pollution prevention and more.

All other educational materials from prior years continue to be available for children, teachers, citizens and businesses.

## **4 MONITORING PROGRAM**

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The NPDES regulations require an ongoing water-quality monitoring program for the term of the permit. The monitoring described in this report was conducted under the City's NPDES Stormwater Discharge Permit Number 101244 issued on 2 March 2004, and Section 9.2 of the City's Second Annual Report and Stormwater Program Evaluation (December 2005) entitled "Revised Stormwater Monitoring Plan." Elements of the monitoring program described in this report are designed to satisfy permit requirements, which include storm event, ambient, and biological and physical monitoring.

For the purposes of the SMP, the term monitoring includes water quality monitoring (sample collection), monitoring activities (such as construction) in a watershed, monitoring changes in a watershed, or monitoring the success of BMPs. This section describes the objectives of the monitoring program, the activities conducted during permit year four of the City's Stormwater NPDES permit.

### **4.1 Objectives of the Monitoring Program**

In addition to the regulatory requirements specified in the permit, the objectives of the Stormwater Monitoring Plan have been to:

- Identify pollutants of concern and their source;
- Identify the degree to which stormwater discharges may be contributing to water quality criteria exceedances in receiving waters;
- Identify, to the best practical extent, the impact of stormwater discharges to the aquatic environment of receiving waters;
- Identify the most effective best management practices (control measures);
- Refine estimates of annual and seasonal pollutant loads;
- Determine the frequency of monitoring required to reveal water quality trends and assess the effectiveness of control measures; and
- Maintain efficient and effective tools for storage, retrieval, and analysis of data collected, and to assure the quality of the data collected.

The monitoring plan was designed to provide technical information to assist in meeting the stated objectives to the maximum practical extent given available resources.

### **4.2 Organization of the Water Quality Monitoring Program**

The storm-water monitoring plan includes three program elements:

- Stormwater quality monitoring
- Ambient receiving water quality monitoring; and
- Data management, analysis, and reporting.



In the following sections, summaries of stormwater and ambient monitoring activities for permit year four are presented. Multiple locations were sampled following the protocol established in the plan and applicable sampling, handling and analysis methods. Data management and analysis are inherent in these activities and in their documentation.

Figures 4-1 and 4-2 are maps of the sampling locations for permit year four including storm water quality monitoring sites, ambient water quality monitoring sites, bacteria monitoring sites, and other water quality assessment sampling sites. All sampling sites are within or near the permit area. Additional large-scale maps and data tables are referenced in each section as applicable.

### **4.3 Stormwater Quality Monitoring**

Stormwater quality monitoring activities during permit year four include the following:

- Collect and analyze storm event water samples from various land uses to assess stormwater quality;
- Collect and analyze surface waters receiving stormwater to assess water quality;
- Field surveys to characterize activities which may contribute to bacteria loads in stormwater; and
- Monitor stormwater quality of an underground injection control device (UIC).

The monitoring plan focuses on specific stormwater drainage basin areas to identify sources of pollutants through a combination of storm event water quality monitoring and assessment of BMPs implemented within the stormwater basin. A substantial number of stormwater NPDES permitted facilities under which the city provides regulatory compliance for the Oregon DEQ, have completed self-monitoring requirements, hence inspection and sampling efforts conducted by city staff are used to verify compliance with stormwater discharge permit limits.

### **4.4 Program Activities**

Program activities for the permit period primarily consisted of field surveys, storm event monitoring, ambient water quality monitoring, structural BMP performance, and surface flows for bacteria water quality characterization.

#### **Golden Gardens Water Quality Assessment**

The Golden Gardens Park is located north of Jessen Drive in northwestern Eugene in the Bethel community (Figure 4-3). An investigatory water quality assessment was initiated in August 2006, by the city in response to a drowning that occurred in the ponds. The city is also in the process of acquiring this property for addition to parks and recreation system. Inflow to the ponds is a combination of ground and surface water flow, with surface flow contributions originating from a fairly large area within the Bethel-Danebo drainage basin. Historically, the area was used to grow small grain crops and later excavated for gravels.

Table 4-1 summarizes those results above the reporting limit for the several sampling events conducted in August and September 2006; Appendix A, Table A-1 presents the comprehensive list of analytes and analytical reporting limits.

Table 4-1 Golden Gardens Water Quality Assessment Summary <sup>1</sup>			
Sampling Date: 8/17/2006			
Analyte	Result	Reporting Limit	Units
4,4'-DDD	0.022	0.0097	µg/l
Chlordane	0.29	0.20	µg/l
<i>Escherichia coli</i>	48	1	per 100 mL
Fecal Coliform	110	1	per 100mL
Phosphorus, Total	0.08	0.01	mg/L
Total Coliform	70	1	per 100mL
Total Kjeldahl Nitrogen	1.1	0.2	mg/L
Zinc, Total	0.06	0.05	mg/L
Verification Resampling Sampling Date: 9/25/2006			
4,4'-DDD	Not detected	0.0096	µg/l
Chlordane	Not detected	0.20	µg/l
Bacteria Sampling – Various Pond Locations Sampling Date: 9/6/2006			
<i>Escherichia coli</i>	20	1	per 100 mL
	71	1	
	24	1	
Fecal Coliform	70	1	per 100 mL
	100	1	
	40	1	
Total Coliform	72	1	per 100 mL
	110	1	
	<1	1	

<sup>1</sup> See Appendix A Table A.1 for full listing of analytes.

Chlordane and a breakdown product of DDT were detected in the sample collected on 8/17/2006; however, Chlordane and 4,4'-DDD were not detected in a second sample collected from the same location on 9/25/2006.

Trace amounts of phosphorus and zinc were detected in the August sampling; the concentration of zinc at 60 µg/L is less than the acute and chronic toxicity water quality standards for the protection of aquatic life, which are 120 and 110 µg/L respectively; there is no human health criterion for zinc. Total phosphorus at 0.08 mg/L is slightly above the concentration expected for an unpolluted stream at 0.03 mg/L. Bacteria counts range from less than one to 110 organisms per 100 mL, below the state numeric bacteria criterion of 406 *E. coli* organisms per 100 mL for a single sample, and the 30-day log mean of 126 *E. coli* organisms per 100 mL. The Total Kjeldahl Nitrogen concentration is 1.1 mg/L and is most likely indicative of organic detritus in the waterbody; note that the nitrate plus nitrite concentration is reported at <0.05 mg/L, suggesting minimal water quality impacts associated with fertilizer use and other nutrient loading within the drainage basin area.

### **Underground Injection Control (UIC) Monitoring**

Stormwater flow to a sedimentation manhole UIC was sampled during two storm events over the last reporting period. Table A-2 in Appendix A presents the results for the 11/2/2006 and 2/14/2007 sampling events for the Anderson/Briana UIC device (MH75938) located in a north Eugene residential subdivision; see Figure 4-4. The concentrations reported for nearly all analytes are less than Oregon numeric groundwater quality maximum contaminant levels and the median of mean effluent concentrations established by the EPA/ASCE International Stormwater Best Management Practices Database. A median was not available in the database for *E. coli* at the time of report preparation, and though the effluent values exceed the Oregon water quality standard, the mineral matrix of the soil column acts as a filter to prevent infiltration of bacteria to subsurface aquifers when the UIC meets applicable federal and state design requirements.

The lower reporting limits observed for the February 2007 sampling event were due to a change in analytical methodology; ICP/MS instrumentation was used in the most recent data as opposed to standard AA and ICP methods.

### **Storm Event Stormwater Quality Monitoring**

Storm event monitoring was conducted at three sites to assess stormwater quality; Barger Avenue at Greenhill Road (MH72815) which outfalls to Amazon Creek, West 5<sup>th</sup> Avenue at Seneca Road (MH63693) which outfalls to the A3 Channel, and Polk at Bailey Street (MH62538) which outfalls to the Willamette River; see Figure 4-4 for a map of monitoring locations.

Stormwater samples collected from the Barger/Greenhill site are primarily comprised of runoff from residential, recreational, and educational land-use areas in the Bethel community. The 5<sup>th</sup> Avenue/Seneca monitoring site receives runoff from industrial and commercial properties. The Polk/Bailey monitoring site receives stormwater runoff from Eugene's core downtown area, which consists of a mix of commercial, industrial, single and multifamily residential, and other land uses.

Laboratory data for stormwater samples collected from these three locations are presented in Appendix A, Table A-3. Figures 4-5 through 4-10 graphically depict the range of values for each analyte. In general:

#### Metals comparisons:

- Arsenic, lead and zinc concentrations vary significantly among the three sites, with concentrations ranging up to several orders of magnitude for lead; silver was not detected at any of the sites.
- Dissolved chromium, copper, lead and zinc are significantly lower at the 5<sup>th</sup> Avenue/Seneca site compared to the other two sites; total and dissolved nickel is highest at this site.
- Dissolved arsenic concentrations are comparable at all three sites, averaging 1.02 µg/L; however, the concentrations of total arsenic are about 7 to 9 times higher at the 5<sup>th</sup> Avenue/Seneca and Polk/Bailey sites at 7.89 and 9.50 µg/L respectively, than observed at Barger/Greenhill (1.09 µg/L).
- Dissolved mercury concentrations are similar at all three sites, ranging from 0.0009 to 0.0022 µg/L; however, total mercury values vary greatly, the 5<sup>th</sup> Avenue/Seneca site having the highest concentration at 0.0296 µg/L.

#### Bacteria comparisons:

- Fecal Coliform and *E. coli* are highest at the 5<sup>th</sup> Avenue/Seneca site; the counts for *E. coli* at this site is 1600 organisms/100 mL. Fecal coliform is three times greater here than at the other two sites at 4700 organisms/100 mL.

#### Other analyte comparisons:

- The COD values are fairly high at all three sites, ranging from 22 to 34 mg/L, and suggests significant concentrations of pollutants.
- Dissolved oxygen values are low, averaging 5.6 mg/L, again indicating the presence of significant concentrations of pollutants.
- Nutrient concentrations are high at all three sites; total phosphorus ranges from 0.19 to 0.66 mg/L and is highest at the 5<sup>th</sup> Avenue/Seneca site. Nitrate+nitrite (as N) ranges from 0.69 to 1.8 mg/L and is highest at the Barger/Greenhill site, suggesting runoff of fertilizers into the MS4.
- Dissolved solids at the three sites range from 130 to 260 mg/L, the highest occurring at the 5<sup>th</sup> Avenue/Seneca site; suspended solids are highest at the Barger/Greenhill site, these range from 22 to 160 mg/L.

The 5<sup>th</sup> Avenue/Seneca site was selected to assess pollutant sources of dichloroethylene and tetrachloroethylene to the A3 Channel; the A3 Channel is listed in Oregon's 303(d) list of impaired waterbodies for both pollutants. Dichloroethylene was not detected, however, tetrachloroethylene was reported at 0.017 µg/L. Additional investigations will be conducted during the next permit year to determine the potential source(s) of this pollutant.

Stormwater quality results for the 5<sup>th</sup> Avenue/Seneca and Barger/Greenhill sites are being further analyzed to determine pollutant contributions to the A3 Channel and Amazon Creek respectively. Flow-proportional sampling was done though additional fine-tuning of the field instrumentation is needed to assess pollutant loadings. A more thorough assessment of storm event monitoring results for these sites will be done as additional data are collected during the next permit year to determine the effects of stormwater on receiving water body quality.

### **Bacteria Pilot Study – Westmoreland Park, Polk Sub-Basin**

The A3 Channel, Amazon Diversion Channel, and Amazon Creek are on the state's 303(d) list as "water quality limited" for bacteria. Stormwater monitoring data indicates that bacteria concentrations in Eugene's stormwater are above the state water-quality criterion and therefore contributes to the bacteria problem. A bacteria pilot study is underway whereby stormwater flow through the piped and open channel system to Amazon and Willow Creeks is sampled for *Escherichia coli* and Fecal Coliform. The extent of the study area includes a portion of the Polk Street MS4 sub-basin principally around the Westmoreland Park area. Goals of the study include: 1) to better understand bacteria source contribution areas through observation and monitoring; 2) design and implement BMPs to reduce bacteria loads to stormwater; and 3) assess through additional monitoring BMP effectiveness in reducing bacteria loads to stormwater and, ultimately, to Amazon Creek. It is anticipated that the most effective BMPs implemented in this study would be applied to other areas within the Amazon basin with the objective of reducing bacteria in the A3 Channel, Amazon Diversion Channel, and Amazon Creek.

Sampling has been underway for *Escherichia coli* and fecal coliform over the course of the fourth permit year at four piped-system locations within the study area and four locations along Amazon Creek. An additional site at Willow Creek will also be sampled when stream flow begins for background comparison purposes as it is relatively undeveloped (see Figures 4-11 through 4-13). Data for two locations, MH55402 and MH55404, were combined because they are on the same MS4 pipe; the location was switched to MH55404 because of easier access to the piped system. Tiara (MH51267) is unique in that the sampling location is within the piped system, though most of the drainage system is open channel through residential neighborhood back yards as shown in Figure 4-13.

The Polk Street sub-basin covers an area of about 1009 acres with land uses consisting of 58% single-family homes, duplexes and mobile homes; 21% roads; 6.7% vacant areas; 4.5% park area; 4.4% educational, and 2.6% multi-family.

Bacteria data are graphically shown in Figures 4-14 and 4-15; at this time there are no data for Willow Creek at 18<sup>th</sup> Avenue because the creek was dry during all sampling events. There are no significant differences in bacteria counts, *E. coli* and fecal coliform, between the four Amazon Creek locations after seven sampling event. Within the piped system, *E. coli* counts at the Westmoreland Park MH52595 site are considerably lower than the other monitoring sites; fecal coliform counts are similar to that at Friendly MH56329, both of which are considerably lower than the Albertson's and Tiara monitoring sites. Note that the highest fecal coliform counts are found at the Tiara site.

In addition to field sampling for bacteria, two ground surveys of the site were done to document basin conditions such as amount, type and location of wildlife and domestic pets; human behaviors; location and number of domestic animal waste piles; conditions within commercial loading areas, recycling areas and garbage dumpster areas, etc. A check-sheet was developed to standardize observations, a copy of which is appended to Appendix A beginning on page A.24. The strongest field evidence possibly contributing to increased bacteria levels in Amazon Creek were waterfowl populations primarily near a pedestrian bridge between Polk and Chambers, as

were numerous nutria. A few individuals were observed feeding the birds which may cause many of the animals to inhabit the area on a more permanent basis. Additional surveys will be performed during the next permit year and studied to identify salient facts which may be attributed to increased bacteria loads in MS4 receiving waterbodies.

#### 4.5 Program Activities

Surface water quality monitoring has been continued from the previous permit at eleven locations through the fourth year of the City's current NPDES permit, including four sites on the Willamette River, one near the Delta Ponds outlet, and six in the Amazon Basin. Surface flows through the Delta Ponds, which consists of sloughs and former aggregate excavation sites, are to the Willamette River. Rehabilitation efforts have been underway by the US ACOE and the City of Eugene to create and enhance riparian habitat for fish spawning and rearing. The sampling site was selected to assess water quality from this area and effects, if any, on the Willamette River. The ambient sampling sites are listed below and locations shown in Figures 4-1 and 4-2. Sampling is generally conducted at each site every other month, though during this period the number of sampling events was seven; two sampling events separated by about two weeks were done in December 2006. All ambient sampling is conducted utilizing clean sampling techniques, and both total and dissolved metals are analyzed.

This section presents analytical results and statistical analyses which characterize receiving water quality at the monitored sites. For the most part grab samples collected every other month represent "snapshots" of ambient water quality – analytical results may not necessarily represent average water quality, or the full range of water quality variability. Sampling events included in the data set for the fourth permit year are for the period beginning July 2006 through June 2007. The historical data set comprises all data collected since January 1997.

<p style="text-align: center;"><b>Table 4-2</b> <b>Ambient Water Quality Monitoring Sites</b></p>
<p><b>Amazon Basin Sampling Sites:</b></p> <ul style="list-style-type: none"> <li>Amazon Creek – Site M2 – at 29<sup>th</sup> Avenue</li> <li>Willow Creek 450 feet north of 18<sup>th</sup> Avenue</li> <li>Amazon Creek at Railroad Track Crossing</li> <li>Amazon Diversion Channel at Royal Avenue</li> <li>A3 Channel at Terry Street</li> <li>Amazon Creek at Royal Avenue</li> </ul>
<p><b>Willamette River Sampling Sites:</b></p> <ul style="list-style-type: none"> <li>Upstream of Urban Growth Boundary (River Mile 186.9)</li> <li>At Knickerbocker Bridge (RM 183.9)</li> <li>At Owosso Bridge (RM 178.6)</li> <li>Delta Ponds North of Beltline Bridge &amp; Upstream of Willamette River Confluence</li> <li>Downstream of Beltline Bridge (RM 176.8)</li> </ul>

## 4.6 Results

Ambient water quality data were screened for outliers before applying statistics tests. Test of skewness, kurtosis, and the Shapiro-Wilk test, all of which are included in commercially available statistics software packages, were applied to identify anomalous measurements. These tests assume normal distribution of water quality measurements. For those distributions that were not normal, best professional judgment was applied in selecting outliers to exclude from further statistical analysis.

A few analytical values were identified as outliers in the 2006-2006 ambient dataset and are identified as such in the summary tables included in Appendix A. Additional outliers were observed in the historical data set and were excluded. Outliers are temporarily excluded; they are added to the data pool at the end of each monitoring period for distribution tests. Analytical data for the permit period are presented in Tables A-4 and A-5.

Censored data, those values reported as less than the reporting limit, are included in the summaries utilizing the restricted maximum likelihood estimation technique for miscellaneous parameters, and the delta distribution estimator for the metals data. These estimators reduce the problems associated with censored data when calculating mean and standard deviation, and are superior to substitution of censored data with one-half the reporting limit. Means and standard deviations for the ambient historical data set are summarized in Tables A-6 and A-7.

### **Seasonal Trends**

The Seasonal Kendall statistic,  $Z$ , is used here to describe long-term analyte trend with consideration given to seasonal variation. This trend estimator is free of distributional assumptions. Developed by the U.S. Geological Survey<sup>2</sup>, the Seasonal Kendall statistic is the most frequently used test to assess trend in environmental data. Seasonal variation based on average monthly precipitation was described in the Permit Year Six Report submitted to DEQ in May 2001, and is utilized here in the Seasonal Kendall test. Four seasons are defined – the wettest season, Period 1, includes November, December, and January. It is followed by Period 2 (February, March, April), comparatively drier months, and Period 3 (May, June, July), the driest period. Months leading to the wet season comprise Period 4 (August, September, and October). Each sampling event for the entire data set (historical and current year data) is assigned to a period based on the sampling date.

The USGS has developed a DOS-executable program to run the Seasonal Kendall test statistic. In this application, rejection of the null hypothesis of no trend is calculated at  $2p = 1\%$ , that is, a  $2p$  value of 0.01 indicates there is a 1% probability of the observed trend due to random sample variability. Program output includes slope estimator,  $m$ , to describe the overall analyte trend.

Results of trend analysis using the Seasonal Kendall test statistic indicate significant trend changes at Willow Creek, the Amazon Diversion Channel at Royal Avenue, the A3 Channel at Terry Street, Amazon Creek at Royal Avenue, at the Owosso Bridge and downstream of the

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<sup>2</sup> Dennis R. Helsel, Mueller, David K., and Slack, James R., Computer Program for the Kendall Family of Trend Tests: U.S. Geological Survey SIR 2005-5275.

Beltline Bridge sites on the Willamette River. Trends noted in previous reports tend to be subtle and their statistical significance frequently changes upon addition of the next set of monitoring results.

Figures 4-16 through 4-28 show these historical data sets plotted against time with trend lines; a summary of the program output is presented in Table A-8 in Appendix A. Significant long-term concentration trends are observed for the following sites:

- Willow Creek: decreasing trends for total lead, total Kjeldahl nitrogen, and total suspended solids;
- Amazon Diversion Channel at Royal Avenue: a slight decreasing trend is observed for total nickel;
- A3 Channel at Terry Street: decreasing trends are observed for both total and dissolved arsenic;
- Amazon Creek at Royal Avenue: decreasing trends for total silver, total nickel, and total lead;
- Willamette River Downstream of Beltline Bridge (RM 176.8): decreasing trends are observed for fecal coliform and total suspended solids; an increasing trend is observed for pH.

There is a small probability that some decreasing trends may not have been identified by the Seasonal Kendall test because the laboratory used to perform the metals analysis was changed in February 2007, though after careful review of the data it is believed all likely and significant trends have been summarized above. Beginning with the February 21-22 sampling event in 2007, the Eugene/Springfield Water Pollution Control Facility (E/S WPCF) Laboratory performed all metals analysis. While the laboratory uses the same analytical methodology, specifically, EPA 200.8, the reporting limits are somewhat greater than those observed prior to February 2007. The E/S WPCF laboratory is reviewing its analytical procedures to ensure optimum instrumentation performance is attained so that continuity of historical trends observed over the last ten years is maintained to the fullest extent possible.

#### **Water Quality Changes: Fourth Permit Year vs. Historical Data Set**

The Mann-Whitney test statistic is used here to assess whether any water quality changes have occurred over the most recent monitoring period compared to the historical data compiled for each sampling location. Mann-Whitney is a nonparametric calculation based on the sums of ranks for independent samples and is suitable for censored data sets. Table A-9 in Appendix A summarizes significant average analyte values for the period, which consists of sampling events in 2006 and 2007, and the average for the historical data set; comparisons are significant at  $\alpha = 0.05$ . The full program output for the statistic is shown in Tables A-10 and A-11.

Note that for purposes of this comparison, averages for annotated analytes include some censored values which are included in the data set at one-half the reporting limit; mean corrected averages cannot be reasonably estimated on small data sets with a large number of censored values, hence the statistical significance of annotated means whose censored values are greater than 50 percent is questionable. In addition, since a portion of the most recent data set includes censored values that are considerably higher than previously observed, mean concentrations



become more difficult to estimate. For example, recent data (permit year four) for silver reportedly differed statistically using the Mann-Whitney test statistic at two monitoring locations – Amazon Creek at the railroad track crossing and at Royal Avenue; however, censored values beginning in February 2007, were greater than historical data. In the case of Amazon Creek at the railroad track crossing, the mean value for the recent dissolved silver data is skewed due to the significantly higher reporting limit (refer to 2006/2007 data in Table A-4). At the Royal Avenue site, the estimated mean for the recent data is lower than the historical mean, though to what degree is uncertain. Further investigation into the ramifications of the reporting limits issue is underway.

### **Amazon Basin Sites**

Referring again to Table A-9 in Appendix A, five of six Amazon basin monitoring sites had recent analyte averages that differed from historical means. Overall 17 of 22 analytes, or 77%, showed statistically significant decreases. Five analytes at three monitoring sites, including cadmium, silver and field pH values, were significantly higher than historical means.

At Willow Creek, the most recent data for total Kjeldahl nitrogen (TKN) were slightly lower than the historical data set. Note that the 2006-2007 TKN data are qualified, with four of seven values reported as less the reporting limit. Likewise, one analyte differed from the historical mean at Amazon Creek at 29<sup>th</sup> Avenue; the pH increased substantially over the recent sampling period by 0.5 pH units to 7.9.

Total metal concentrations for chromium, lead, mercury, and nickel were found to be significantly lower over the recent sampling period at Amazon Creek at the Railroad Crossing; on average, total chromium was 43% (0.80 µg/L) lower than the historical mean at 1.04 µg/L, total lead was 60% (1.5 µg/L) lower at 1.02 µg/L, mercury 38% (0.00409 µg/L) lower at 0.00671 µg/L, and nickel was 23% (0.6 µg/L) lower at 2.00 µg/L. Dissolved cadmium increased 128% (0.0077 µg/L) to 0.0137 µg/L, and dissolved silver is estimated to have increased 200% to 0.00850 µg/L, though as explained above this increase is suspect because of the number of censored values. Recent total phosphorus values were 42% (0.12 mg/L) lower than the historical mean at 0.069 mg/L.

At the Amazon Diversion Channel at Royal Avenue, total cadmium and dissolved nickel differed significantly from the historical mean; the recent total cadmium mean was 49% (0.0124 µg/L) higher at 0.0376 µg/L, while dissolved nickel was 26% (0.62 µg/L) lower at 1.76 µg/L.

Downstream of the Amazon Creek at the Railroad Crossing at Royal Avenue, total chromium, lead, mercury, nickel and silver were lower than the historical mean, as was dissolved chromium. In the case of dissolved chromium, the mean of the recent data was 60% (0.51 µg/L) lower than the historical mean at 0.332 µg/L; total chromium dropped 39% (0.75 µg/L) to 1.15 µg/L. A decrease similar to that observed upstream was seen for total lead – the recent mean was 62% (1.07 µg/L) lower at 1.62 µg/L. Total mercury at this site was 35% (0.00259 µg/L) lower than the historical mean at 0.00479 µg/L, total nickel also falling 40% (1.07 µg/L) to 1.62 µg/L. With the exception of total chromium, the average downstream concentrations of total lead, total mercury, and total nickel were lower than upstream concentrations.

The significance of the change in total silver concentration in Amazon Creek at Royal Avenue is suspect given that the number of censored values exceeds half of the data set, and the reporting limit was substantially higher for the last three data values in the 2006-2007 sampling period. As described above, the estimated mean for the recent total silver value is lower than the historical mean, though to what degree is uncertain.

Other parameters showing statistically significant changes from the historical data set at the Amazon Creek at Royal Avenue site include pH, which increased 0.7 pH Units to 8.2; total phosphorus decreased 42% (0.05 mg/L) to 0.07 mg/L; TKN was slightly lower than the historical mean at 0.3 mg/L; and total suspended solids (TSS) and turbidity decreased 63% (17 mg/L) and 45% (14 NTU) respectively to 10 mg/L and 17 NTU.

### **Willamette River Sites**

All four Willamette River monitoring sites had recent analyte averages that differed from historical means. Overall, 13 of 18 analytes, or 72%, showed statistically significant decreases. The following paragraphs refer to Table A-9 in Appendix A. Upstream of the urban growth boundary, ortho phosphorus was 0.01 mg/L lower than the historical mean at 0.02 mg/L. Moving downstream to the Knickerbocker Bridge site, significant increases in copper and zinc were observed over the historical mean; dissolved copper was 33% (0.118 µg/L) higher at 0.477 µg/L, dissolved zinc was 173% (0.812 µg/L) higher at 1.28 µg/L, and total zinc 122% (1.37 µg/L) higher at 2.49 µg/L. *Escherichia coli* counts were 48% (17 organisms/100 mL) lower, on average, at 18 MPN/100 mL. As was observed upstream, ortho phosphorus dropped slightly, 0.01 mg/L, to 0.02 mg/L.

At the Owosso Bridge site, both *E. coli* and fecal coliform counts were lower during the 2006-2007 sampling period than the historical mean; both *E. coli* and fecal coliform counts were 56% (25 and 23 organisms/100 mL, respectively) lower at 20 and 18 MPN/100 mL respectively. The pH at this site also increased significantly above the historical mean, increasing 0.5 units to a pH of 7.7. As with the upstream sites, the mean ortho phosphorus concentration was slightly lower at 0.02 mg/L. A small decrease was also observed for total magnesium (12%, 0.2 mg/L) to 1.5 mg/L.

Moving to the farthest downstream monitoring location, downstream of the Beltline Bridge, similar patterns are observed for the 2006-2007 data set; total calcium, magnesium, and the overall hardness of the river at this site decreased slightly. In addition, *E. coli* and fecal coliform counts are 54% lower for the most recent data set compared to the historical mean, at 22 and 21 MPN/100 mL respectively. A modest decrease was also observed for TKN to 0.2 mg/L.

### **Intra-Basin Water Quality Differences**

In addition to temporal changes in water quality, intra-basin differences are of interest – specifically, the water quality differences between an upstream and downstream monitoring site. Comparisons described in this section utilize the historical data set for each monitoring location, including the data recently acquired in the fourth permit year.

The Mann-Whitney statistic was also used to examine intra-basin water quality differences; censored values were included at one-half the reporting limit. Upstream to downstream

comparisons were evaluated at a significance level of  $\alpha = 0.05$ . Tables A-12 and A-13 presents average concentrations for each pair of monitoring sites meeting the significance criterion; note that the values reported in this table represent mean corrected averages as derived from the estimators described above.

Included in the analysis is a comparison of the 29<sup>th</sup> Avenue M2 site on Amazon Creek and the site on Willow Creek (see Figure 4-2), streams which originate in different sub-basins. Relative percent differences of historical mean concentration values for chromium, copper, lead, and zinc range from 32 to 121% greater at the Amazon Creek at 29<sup>th</sup> Avenue site; total arsenic is 29% higher at the Willow Creek monitoring site. Nutrients and bacteria also tend to be greater at the Amazon Creek site at 29<sup>th</sup> Avenue; fecal coliform at 293 MPN/100 mL and *Escherichia coli* at 1042 MPN/100 mL are 3.5 and 8.6 times greater, respectively, than bacteria counts observed at Willow Creek. Ortho and total phosphorus, nitrate plus nitrite as nitrogen ( $\text{NO}_3 + \text{NO}_2 - \text{as N}$ ), and pH are also slightly greater at the Amazon Creek site.

In general, bacteria counts tend to be greater at Amazon Creek at 29<sup>th</sup> Avenue than at the next two downstream locations – Amazon Creek at the Railroad Crossing, and Amazon Diversion Channel at Royal Avenue; total phosphorus, biochemical and chemical oxygen demand, temperature, suspended solids, and turbidity tend to increase downstream. Most metals also tend to increase downstream. There are a few noteworthy exceptions, however:

- A3 Channel at Terry Street (upstream) compared to Amazon Creek at Royal Avenue (downstream)

21 of 23 analytes having statistically significant difference have historical averages that are greatest upstream at the Terry Street site, including biochemical and chemical oxygen demand (BOD & COD), calcium and magnesium (hardness), dissolved and total solids (TDS & TS), conductivity, ortho and total phosphorus,  $\text{NO}_3 + \text{NO}_2 - \text{as N}$ , and TKN; metals include total and dissolved cadmium, nickel and zinc, and total copper, lead and mercury. Ammonia and total silver concentrations were greater downstream at the Amazon Creek Royal Avenue site.

- Amazon Creek – Site M2 – at 29<sup>th</sup> Avenue (upstream) compared to Amazon Creek at Railroad Track Crossing (downstream)

7 of 22 analytes having statistically significant difference have historical averages that are greatest upstream at the Amazon Creek at 29<sup>th</sup> Avenue. Total copper and dissolved zinc were 61 and 14% higher, respectively, at 3.28  $\mu\text{g/L}$  and 10.3  $\mu\text{g/L}$  for the Amazon Creek at 29<sup>th</sup> Avenue site. Dissolved oxygen, pH, ortho phosphorus,  $\text{NO}_3 + \text{NO}_2 - \text{as N}$ , and *E. coli* were also higher upstream.

- Amazon Creek – Site M2 – at 29<sup>th</sup> Avenue (upstream) compared to Amazon Diversion Channel at Royal Avenue (downstream)

5 of 27 analytes having statistically significant difference have historical averages that are greatest upstream at the Amazon Creek at 29<sup>th</sup> Avenue site. The average concentration

for dissolved zinc was 28% higher at the upstream site at 10.3 µg/L; nutrients ortho phosphorus and  $\text{NO}_3+\text{NO}_2 - \text{as N}$  were also higher upstream by 18 and 33% respectively. Ortho phosphorus concentration averaged 0.06 mg/L and  $\text{NO}_3+\text{NO}_2 - \text{as N}$  averaged 0.32 mg/L over the historical record. In addition, *E. coli* and fecal coliform were over 60% higher upstream; counts for *E. coli* averaged 1042 and 293 for fecal coliform.

- Amazon Creek at Railroad Track Crossing (upstream) compared to Amazon Diversion Channel at Royal Avenue (downstream)

4 of 15 27 analytes having statistically significant difference have historical averages that are greatest upstream at the Amazon Creek at Railroad Track Crossing. Total and dissolved mercury, and total silver ranged from 39 to 65 percent greater at the upstream site. In addition, fecal coliform was 55% higher upstream at 272 MPN/100 mL.

Results of the Mann-Whitney test statistic applied to historical data for the Willamette River monitoring locations indicate that for those analytes significant at  $\alpha = 0.05$ , analyte concentrations at downstream sites were consistently higher than at corresponding upstream sites.

Fecal coliform counts increase from 25 to 33 MPN/100 mL over the river reach downstream of the urban growth boundary to the Knickerbocker Bridge; *E. coli* counts increase by a similar count from 21 to 28 MPN/100 mL. There were no statistically significant bacteria increases over the river reaches extending from the Knickerbocker Bridge to Owosso Bridge or Owosso Bridge to Downstream of the Beltline Bridge; however, comparison of the uppermost upstream (upstream of the urban growth boundary) to the lowermost downstream (downstream of the Beltline Bridge) monitoring locations, relative percent differences for fecal coliform and *E. coli* counts are 67 and 57 percent respectively, greater downstream.

Total lead is the only other analyte whose concentration changes significantly between the Knickerbocker and Owosso Bridges, concentrations increases 11 percent to 0.0981 µg/L.

Between the Owosso Bridge and Downstream of the Beltline Bridge, 11 of 12 analytes have statistically significant concentration changes; nitrogen and phosphorus nutrients, conductivity, suspended solids, and metals copper, lead, silver, and zinc concentrations are greatest at the downstream monitoring location.  $\text{NO}_3+\text{NO}_2 - \text{as N}$  increases four-fold from 0.03 to 0.12 mg/L while a small decrease is observed for ammonia downstream. TKN also increases downstream from less than the reporting limit (0.2 mg/L) to 0.3 mg/L. Ortho and total phosphorus increase 67 percent to 0.06 and 0.08 mg/L respectively. A slight increase in conductivity and total solids is also observed.

Metals concentrations increase for dissolved copper, dissolved lead, total silver, and total and dissolved zinc, with increases ranging from 18 and 69 percent downstream. Most of the water quality changes observed over the river reach extending from upstream of the urban growth boundary to downstream of the Beltline Bridge occur after flowing past the Owosso Bridge.

A comparison of the water quality data for monitoring sites on either end of the river reach upstream and downstream of the urban growth boundary, indicate there are several analytes of significance. These are summarized in the table below.

<b>Table 4-3</b> <b>Comparison of Average Historical Analyte Concentrations<sup>1</sup></b> <b>Willamette River</b> <b>Upstream and Downstream of the Urban Growth Boundary</b>			
<b>Analyte</b>	<b>Units</b>	<b>Upstream of Urban Growth Boundary (RM 186.9)</b>	<b>Downstream of Beltline Bridge (RM 176.8)</b>
Arsenic – Total	(µg/L)	0.262	0.319
Arsenic – Dissolved		0.208	0.252
Copper – Dissolved		0.322	0.437
Copper – Total		0.603	0.759
Lead – Dissolved		0.00773	0.0199
Lead – Total		0.0812	0.105
Silver – Total		0.00340	0.00861
Zinc – Dissolved		0.417	0.787
Zinc – Total	(Col./100 mL)	1.11	1.80
<i>Escherichia coli</i>		25	45
Fecal Coliform		21	42
Nitrate+Nitrite – as Nitrogen		0.03	0.12
Total Kjeldahl Nitrogen		< 0.2	0.3
Phosphorus – Ortho		0.03	0.06
Phosphorus – Total		0.03	0.08
Calcium – Total		4.8	5.2
Magnesium – Total	(mg/L)	1.6	1.7
Hardness		18	20
Specific Conductance	(µmhos/cm)	47	54
<sup>1</sup> Mann-Whitney test statistic comparisons significant at α = 0.05.			

A final comparison is between Delta Ponds and the Willamette River at the Owosso Bridge. Fifteen of 18 analytes having statistically significant differences are associated with higher concentrations at the Delta Ponds site. Average arsenic, copper, nickel and zinc concentrations range from 38 to 162 percent higher in samples from Delta Ponds. Total phosphorus,  $\text{NO}_3+\text{NO}_2$  – as N, total and dissolved solids, calcium, magnesium and associated hardness, as well as conductivity values, are also higher for Delta Ponds with relative percent differences ranging from 76 to 148 percent. The average dissolved oxygen concentration is considerably greater at the Owosso Bridge site at 10.9 mg/L compared to 6.2 mg/L. Interestingly both total and dissolved mercury concentrations are 28 and 110 percent higher, respectively, in the Willamette River at Owosso Bridge.

### **Comparison of Ambient Water Quality Data to Oregon Standards**

Water quality standards and beneficial uses for surface waters are defined in Chapter 340, Division 41 of the Oregon Administrative Rules (OAR). Analytical results for surface water samples collected from Amazon Basin and Willamette River sites are assessed in this section for overall conformance to Oregon water quality standards.

Boxplot charts are shown below (Figures 4-29 through 4-41) for water quality parameters from the Amazon Basin and Willamette River that exceed Oregon standards. The horizontal line in the middle of the box for each analyte marks the median of the sample set; the median splits the ordered sample set in half. The box represents the central 50 percent of data values; the outer edge of each box mark the 25<sup>th</sup> and 75<sup>th</sup> percentiles. Whiskers extending from the box mark the range of values that fall within 1.5 box-lengths from the 25<sup>th</sup> or 75<sup>th</sup> percentile. Outliers and extreme values are also depicted in the figures and are defined using different criteria than those used to identify anomalous measurements. Values that are more than 1.5 box-lengths from the 25<sup>th</sup> or 75<sup>th</sup> percentiles are identified as outliers and are denoted by an open circle; extreme values are more than 3 box-lengths and are denoted by an asterisk. The total number of samples in each data set, n, is also indicated.

All six monitoring stations in the Amazon Basin were grouped together to obtain a visual synopsis of the analytical data, as were the data for the Willamette River. Note that all total and dissolved metals values were grouped together for each analyte. The boxplots provide a means of visually characterizing the data sets in terms of the number of sampling events exceeding the applicable water quality standard. Appendix B (Figures B.1 through B.89) presents boxplots for the entire historical data set charting each water quality parameter by monitoring location.

Boxplot chart summaries of the ambient water quality data also depict applicable Oregon water quality standard for each analyte. The water quality standard is defined by a vertical line through the concentration axis with the applicable criterion listed at the top of the chart. In some cases several criteria will be applicable given the observed range of analyte values, such as chronic and acute toxicity criteria for copper. Metals toxicity criteria are adjusted for hardness using the equations of Table 20 in OAR 340-041.

In the case of arsenic (Figure 4-29), all samples – both total and dissolved fractions – collected from the Amazon Basin and Willamette River monitoring locations exceed the human health criterion, which is 0.0022 µg/L; the highest observed concentrations from Amazon basin sites

exceed the standard by almost four orders of magnitude, while data for Willamette River exceed the standard by about two orders of magnitude.

Copper concentrations measured at monitoring sites from both the Amazon Basin and Willamette River (Figure 4-30) are mostly less than the acute and chronic criteria; multiple outliers and extreme values are observed in the Amazon basin data set, exceeding the acute criterion by up to five times the 5.0 µg/L standard.

Most samples collected from the Amazon Basin also exceeded the chronic criterion for lead (0.15 µg/L; (Figure 4-31)); a few samples observed as outliers and extreme values exceeded this most stringent standard at the Willamette River sites.

Mercury concentrations at Amazon Basin sites (Figure 4-32) on occasion exceeded the chronic criterion of 0.012 µg/L, consisting primarily of outliers and extreme values, but also values within 1.5 times the 75<sup>th</sup> percentile as defined by the extent of the whisker (about 0.013 µg/L). At the Willamette River sites only a few extreme values exceeded the chronic criterion for mercury.

The acute criterion for silver is 0.0029 µg/L and nearly all samples collected from both the Amazon Basin and Willamette River exceed this water quality standard (Figure 4-35). Some values are observed at less than 1.5 times the 25<sup>th</sup> percentile.

Amazon Basin samples occasionally exceed both the chronic and acute criteria for zinc (Figure 4-38), which are 29 and 31 µg/L respectively. Exceedances are primarily outliers and extreme values, and some samples at 1.5 times the 75<sup>th</sup> percentile (about 37 µg/L). One sample collected from the Willamette River exceeded both the chronic and acute criteria for zinc.

Exceedances of non-metal water quality standards were also observed for samples collected from the Amazon Basin and Willamette River. These included dissolved oxygen, bacteria, pH, and temperature. Minimum dissolved oxygen criteria are not met at either the Amazon Basin or Willamette River sites for at least some periods of the year – typically summer months when water temperatures are warmer and stream flows are lower. Boxplots in Figure 4-37 indicate that at least one-quarter of samples measured at the Amazon Basin sites did not meet the 6.5 mg/L minimum dissolved oxygen criterion; about 35 percent of the samples measured at the Willamette River sites did not meet the 11.0 mg/L minimum dissolved oxygen criterion.

*Escherichia coli* counts exceed the criterion of 406 organisms per 100 mL in about 35 percent of samples collected from the Amazon Basin sites (Figure 4-38); no samples exceeded the criterion at the Willamette River sites. The magnitude of exceedance at the Amazon Basin sites is an order of magnitude greater than the criterion. Unlike the Amazon Basin sites where bacteria counts tend to decrease downstream, bacteria counts in samples from the Willamette River increase as the river flows through the urban growth area.

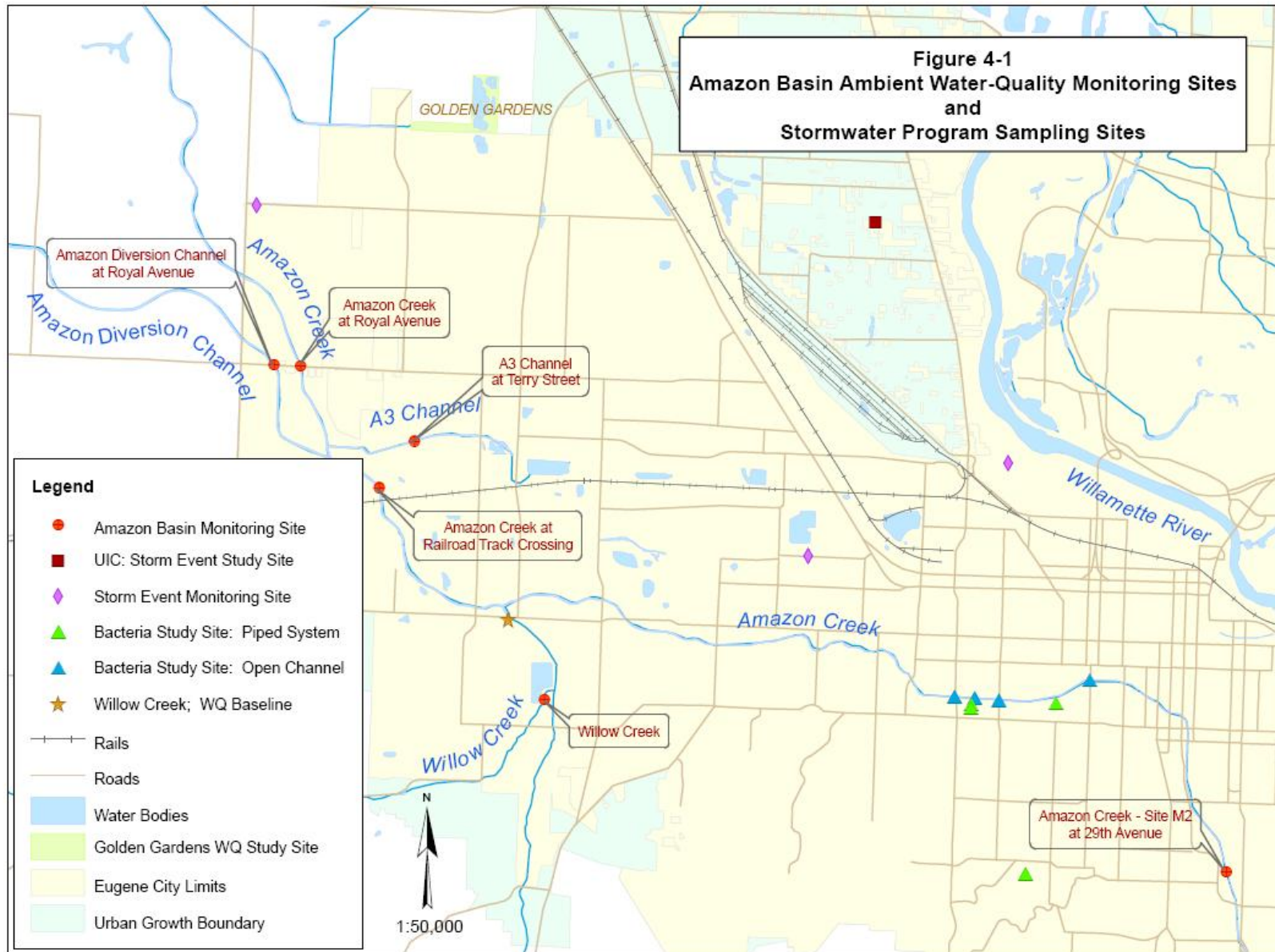
Field pH measurements from Amazon Basin sites sometimes exceeded both the minimum and maximum pH criteria of 6.5 and 8.5 pH units respectively; a few samples from the Willamette River sites exceeded the minimum pH criterion ((Figure 4-39).

Over half of the samples collected from the Amazon Basin exceeded the salmon and trout rearing and migration temperature criterion of 18 °C (Figure 4-41), effective over the period of May 16<sup>th</sup> through October 14<sup>th</sup>; only a few samples from the Willamette Basin exceeded this criterion. The salmon and steelhead spawning temperature criterion of 13 °C (Figure 4-40) is effective over the period of October 15<sup>th</sup> through May 15<sup>th</sup>, and a few samples from both the Amazon Basin and Willamette River monitoring stations exceeded this criterion.

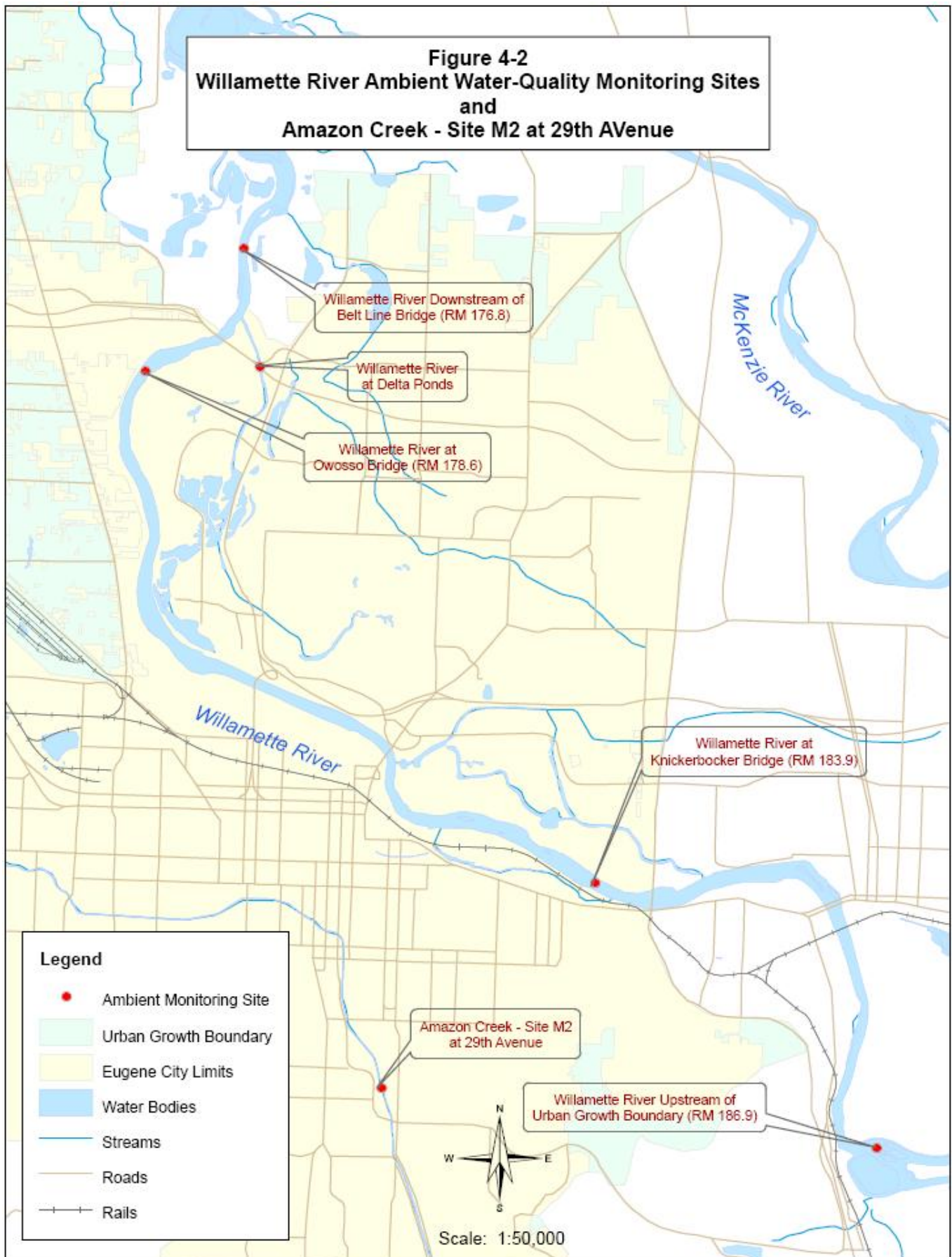
Figures B.84 through B.90 in Appendix B are boxplots of turbidity measurements compared to the applicable flow-based turbidity target defined in Chapter 10 on page 212 of the Willamette Basin TMDL. DEQ derived the Amazon Creek turbidity targets using Long Tom River flows near Noti as a reference river discharge. Collection dates for historical turbidity values measured under the ambient monitoring program were correlated to river flows on the Long Tom recorded by the USGS. The applicable turbidity target was then derived for each turbidity value; boxplots of the data sets are grouped by the applicable turbidity target, as defined on each chart. Most of the turbidity values measured at downstream locations exceeded the applicable criterion, while at upstream sites the data range from some to all values meeting the criterion. Significant efforts will be necessary to improve water quality so that it meets the turbidity targets required by DEQ.

OAR 340-041-0036 describes the turbidity criterion applicable to the Willamette River, which states that no more than a ten percent cumulative increase in natural stream turbidities may be allowed as measured relative to a control point immediately upstream. No statistically significant difference was observed between turbidity values measured at the four monitoring locations on the Willamette River, nor was there a statistically significant difference between the most distal sites compared, that is, upstream and downstream of the Eugene urban growth boundary (see table above). Figure B.78 presents turbidity boxplots for the Willamette River sites.





**Figure 4-2**  
**Willamette River Ambient Water-Quality Monitoring Sites**  
**and**  
**Amazon Creek - Site M2 at 29th Avenue**



**Figure 4-3**  
**Golden Gardens Park**  
**Water Quality Study**

**Legend**

- Park Area
- Surface Water Body
- Eugene City Limits

Scale: 1:10,000

Map labels include: IRVING, HWY 99, GOLDEN GARDENS, IRWIN, JESSEN, DEVOS, MELROSE, ROSEBAY, PRIMROSE, CUBIT, NOAH, BELTLINE, PARKER, LAURELHURST, DEWEY, DANERO, BLUE HERON, COSMOLEDO, ASSUMPTION, MAHE, LEMURIA, AMIRANTE, COETIVY, SUGARPINE, TREVON, SILHOUETTE, TERRY, OHIO, CODY, WISCONSIN, DAKOTA, MINNESOTA, BURNETT, STATE STREET, PRASLIN, and IRWIN.



**Figure 4-4**  
**Storm Event Water Quality Study**  
**Stormwater Piped System and UIC Monitoring Locations**

**Legend**

- Stormwater Monitoring Sites
  - Piped System Monitoring Site (Red cross)
  - UIC Monitoring Site (Green square)
- Open\_Channel (Brown line)
- Stormwater Piped System (Purple line)
- Eugene City Limits (Yellow area)
- Surface Water Body (Blue area)

Scale: 1:35,000

Figure 4-5

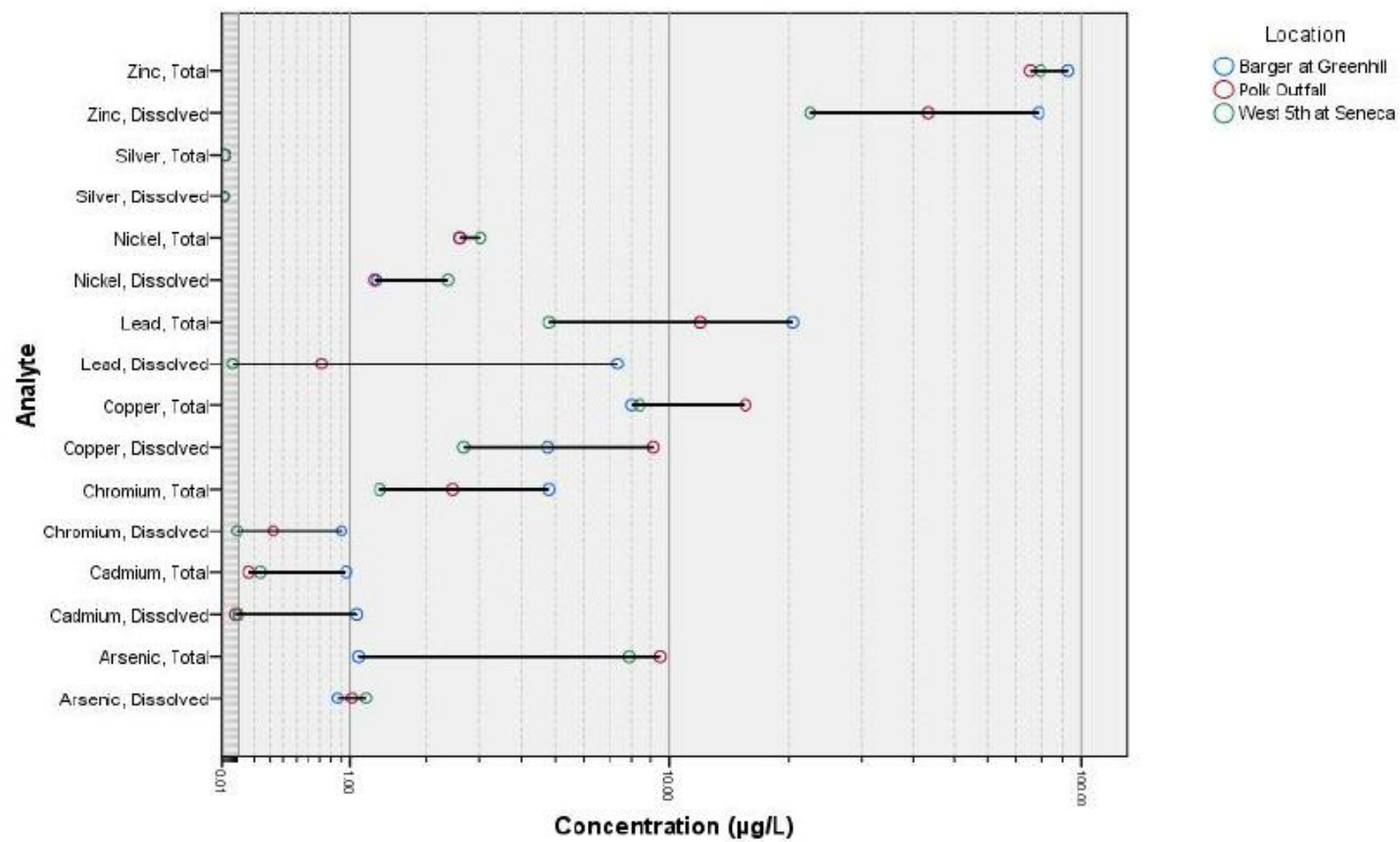


Figure 4-6

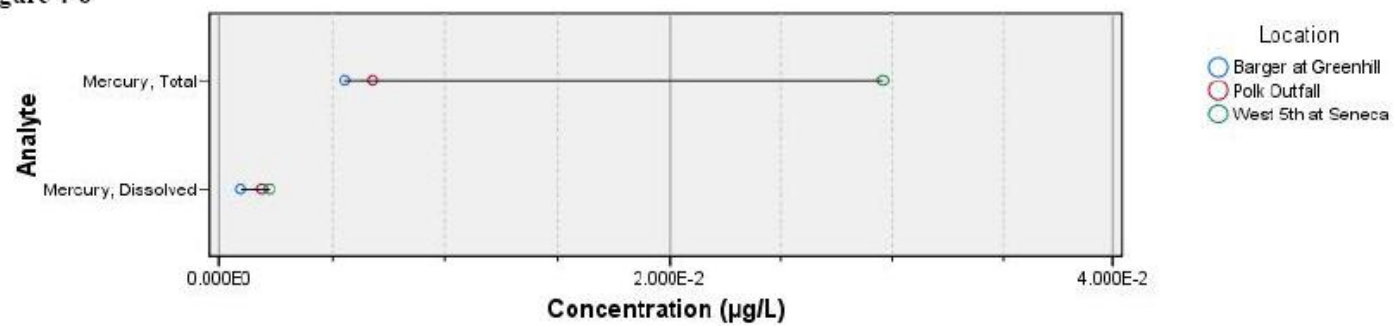
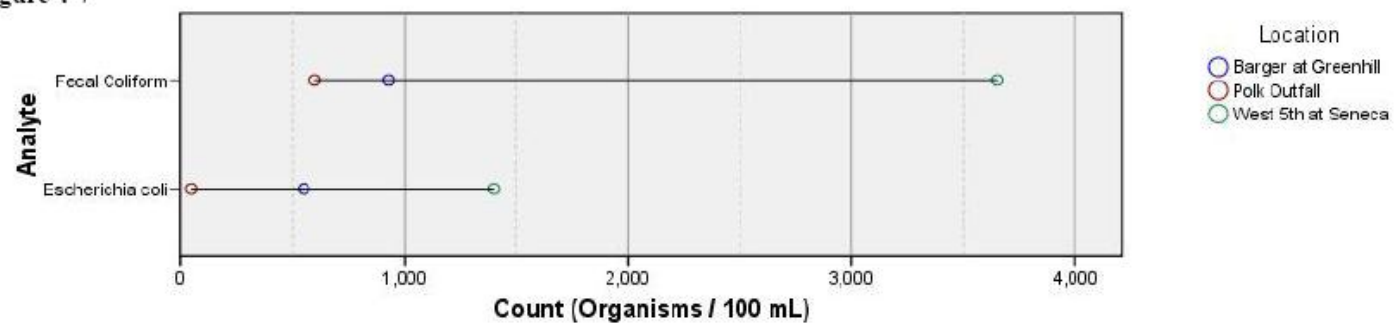
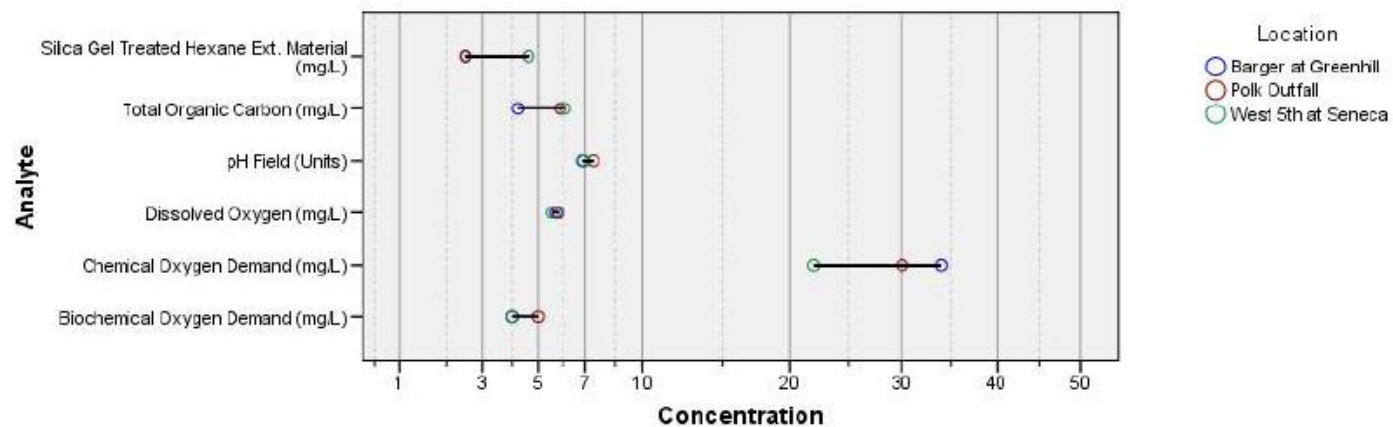


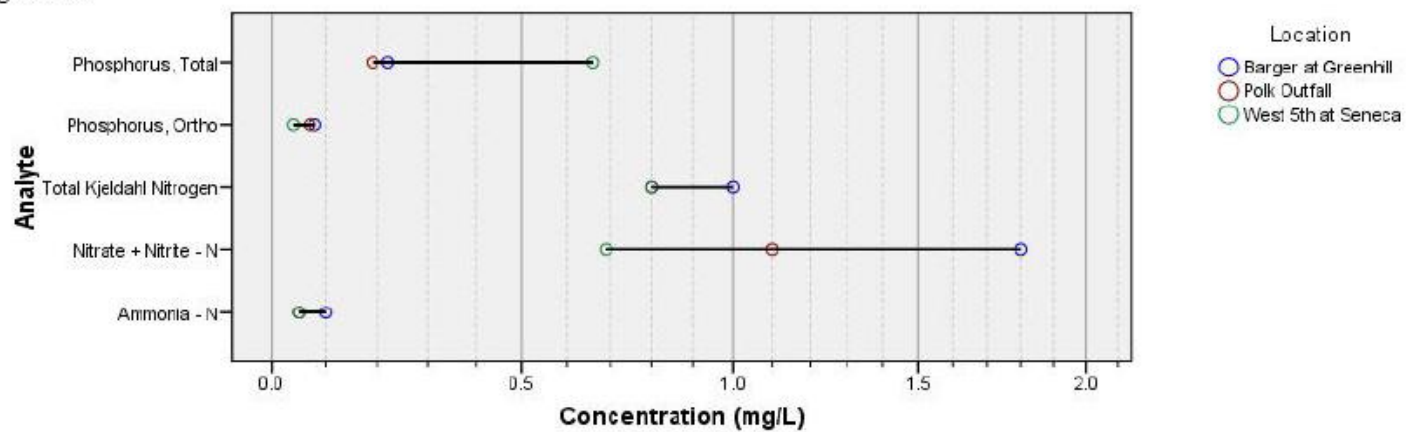
Figure 4-7



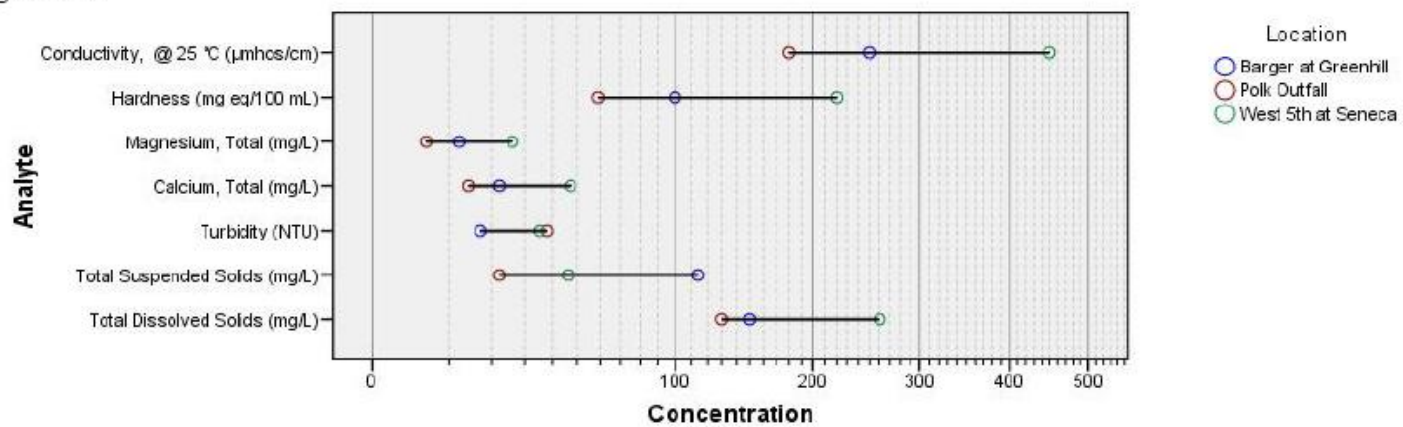
**Figure 4-8**



**Figure 4-9**

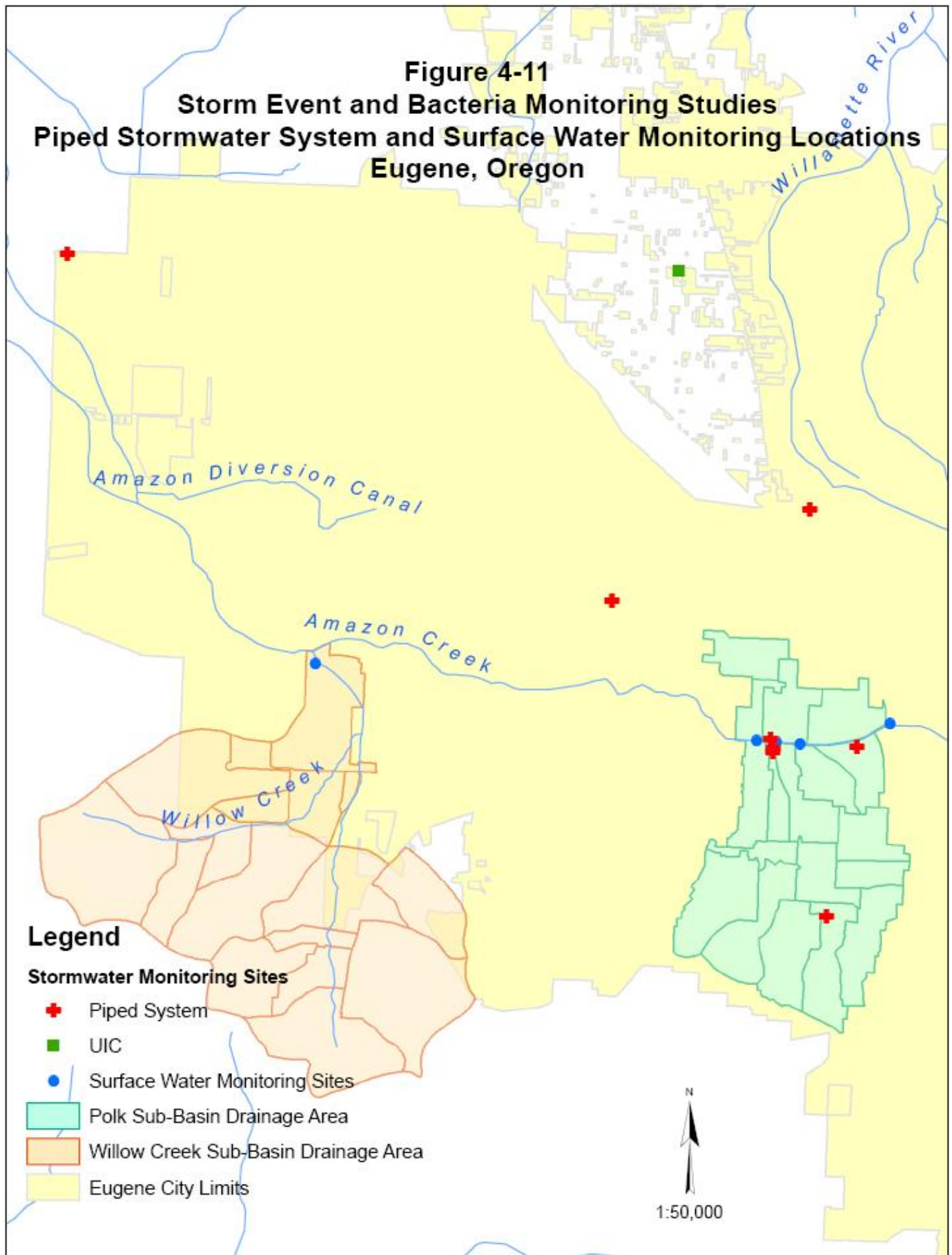


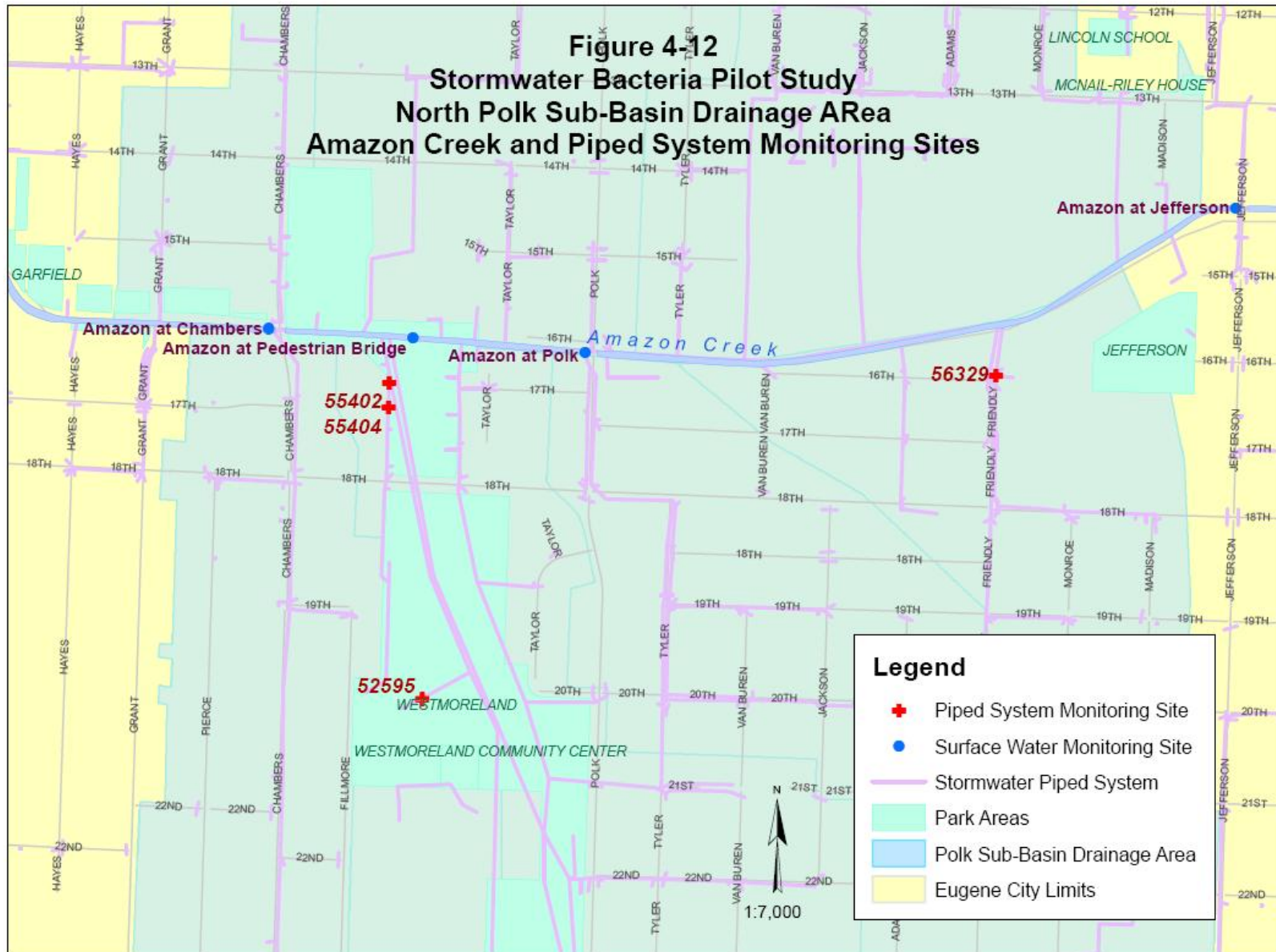
**Figure 4-10**





**Figure 4-11**  
**Storm Event and Bacteria Monitoring Studies**  
**Piped Stormwater System and Surface Water Monitoring Locations**  
**Eugene, Oregon**







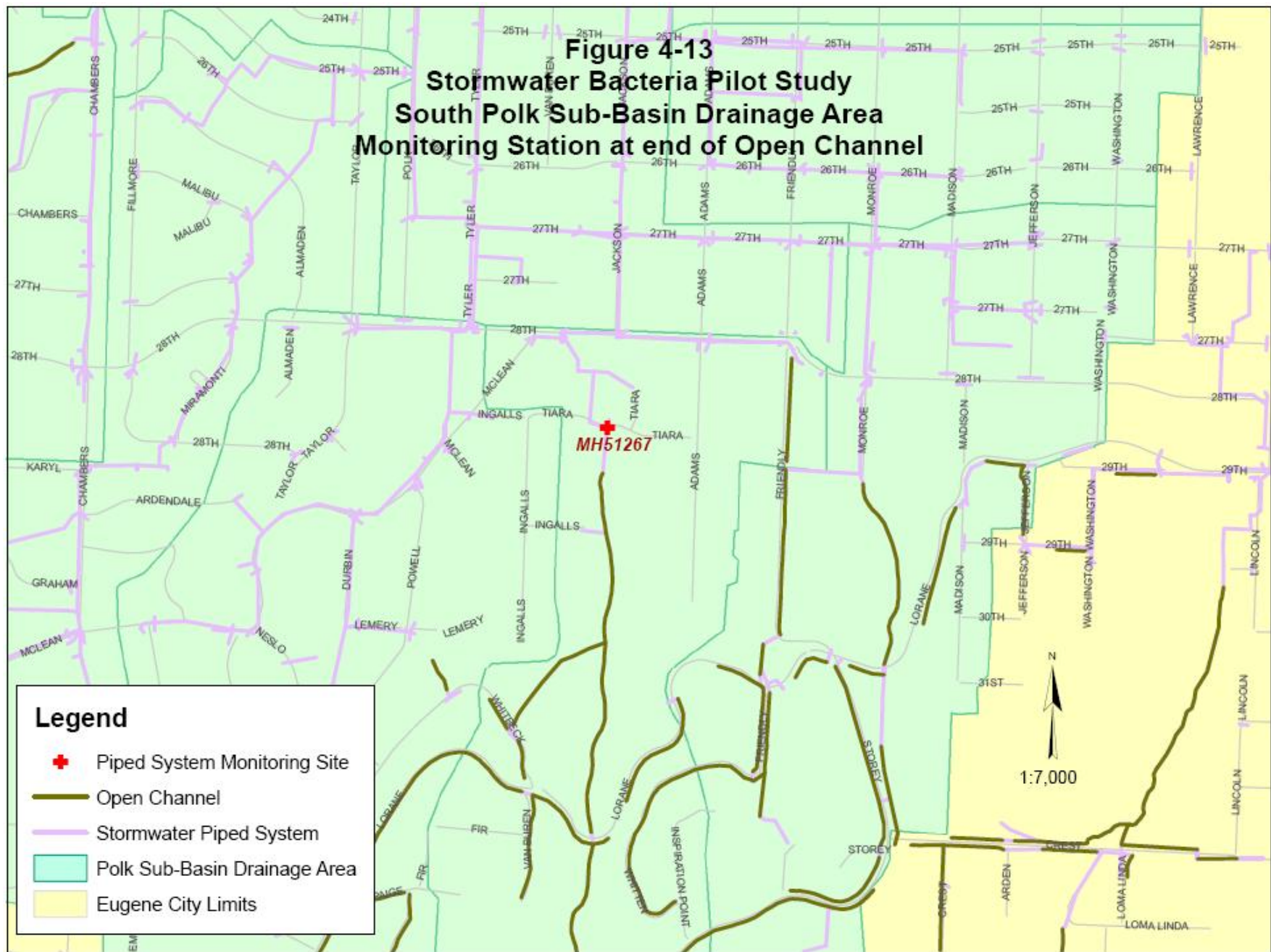


Figure 4-14

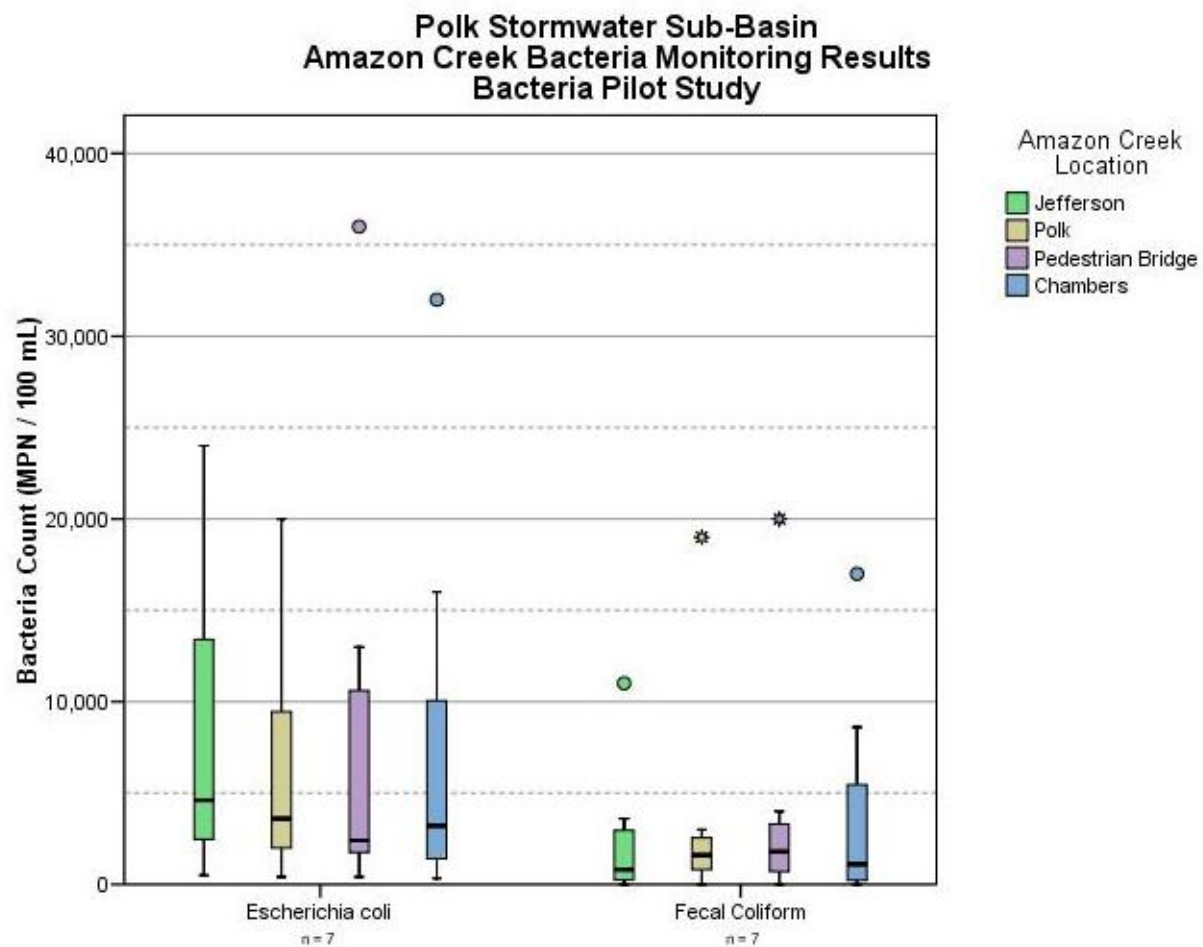


Figure 4-15

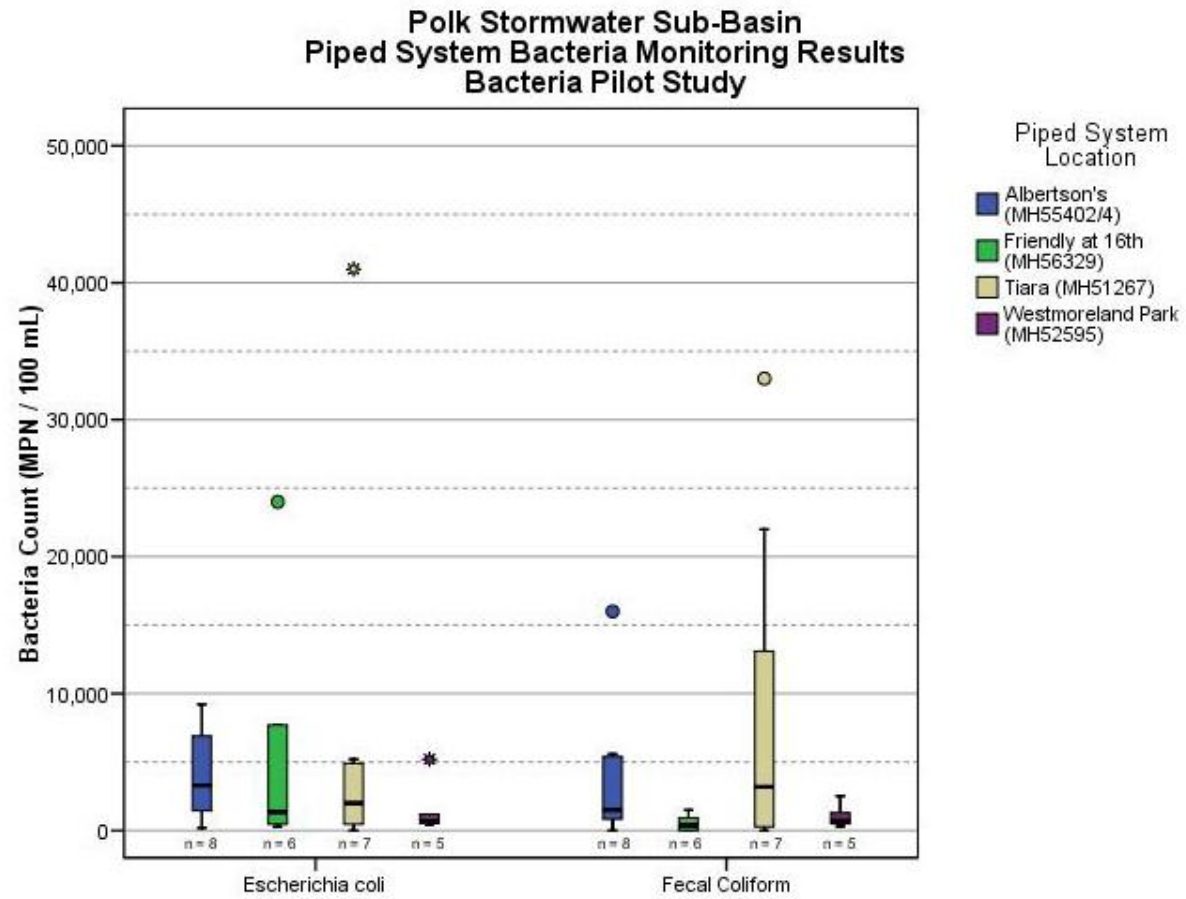


Figure 4-16  
Willow Creek  
Trend for Total Lead

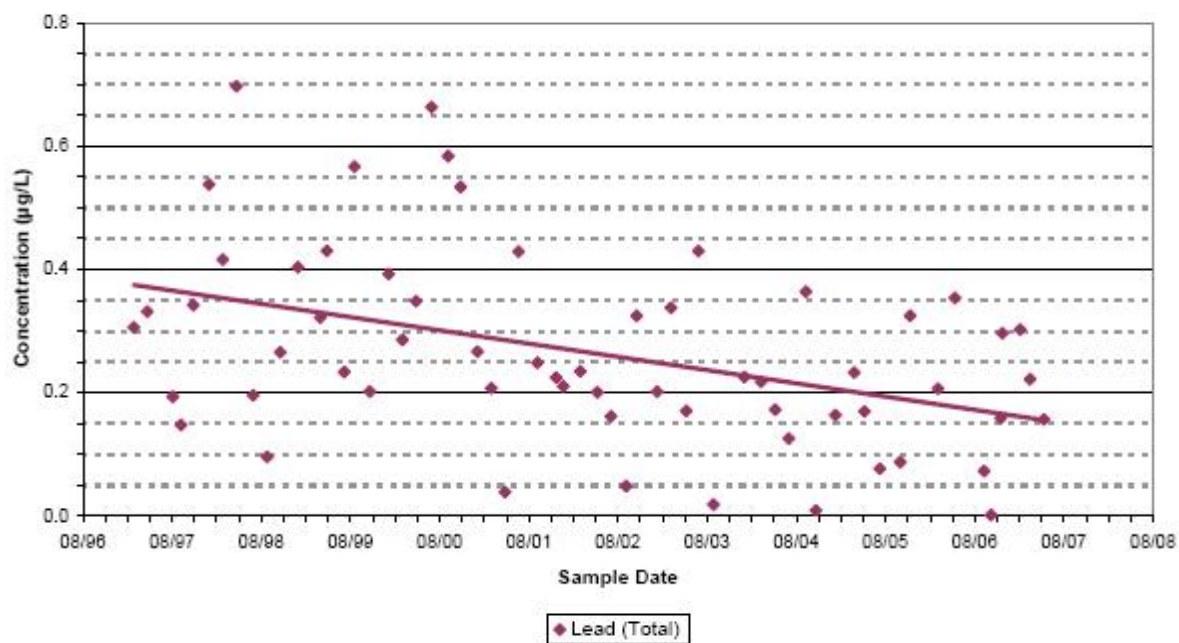


Figure 4-17  
Willow Creek  
Trend for Total Kjeldahl Nitrogen

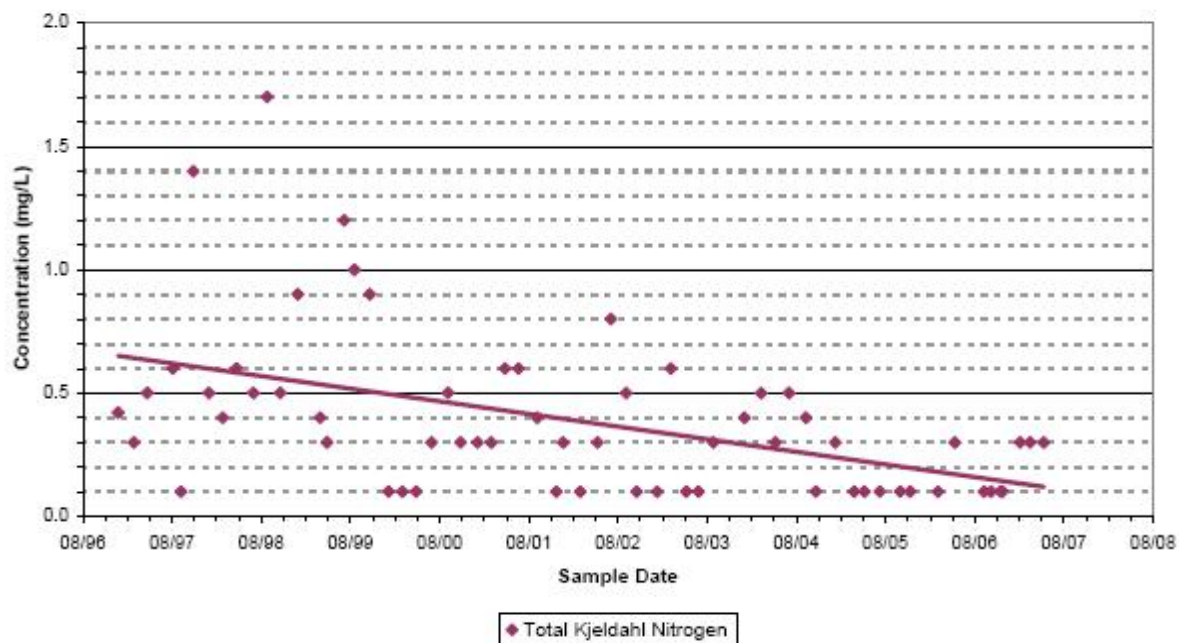


Figure 4-18  
Willow Creek  
Trend for Total Suspended Solids

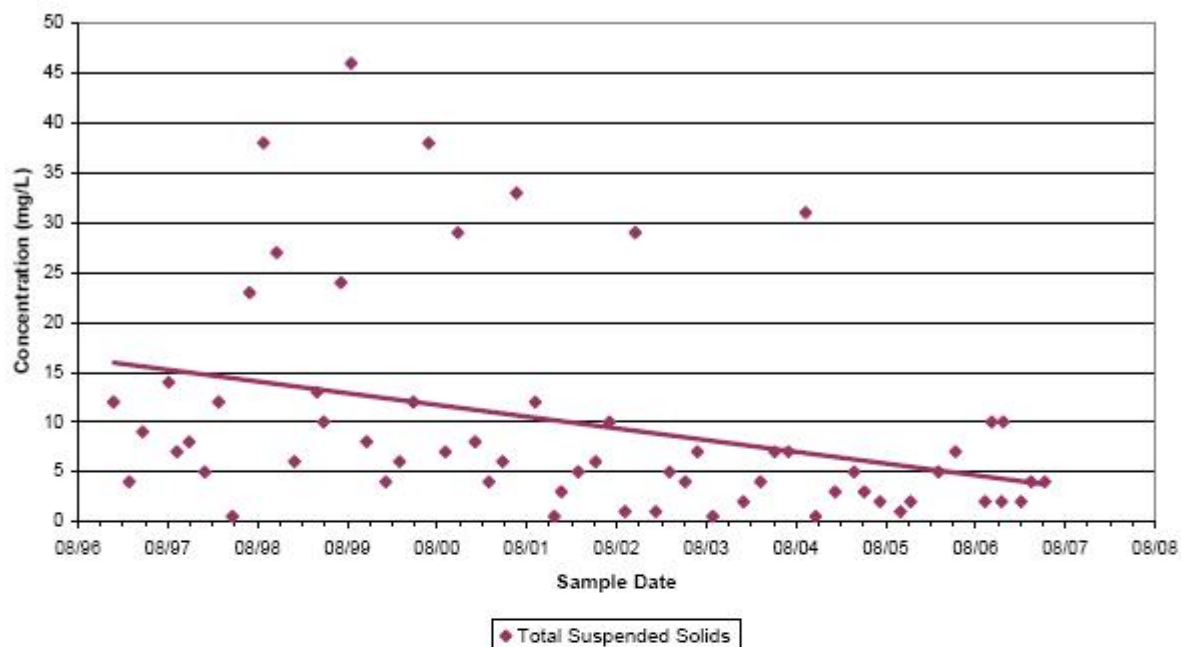


Figure 4-19  
Amazon Diversion Channel at Royal Avenue  
Trend for Total Nickel

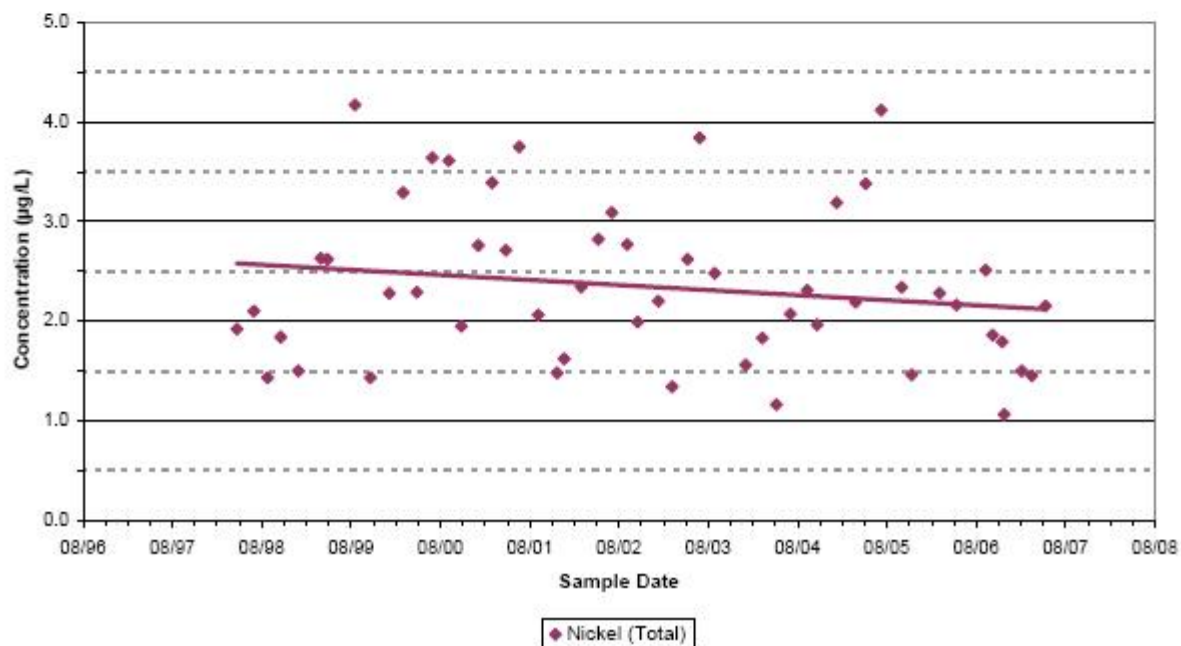




Figure 4-20  
A3 Channel at Terry Street  
Trend for Dissolved Arsenic

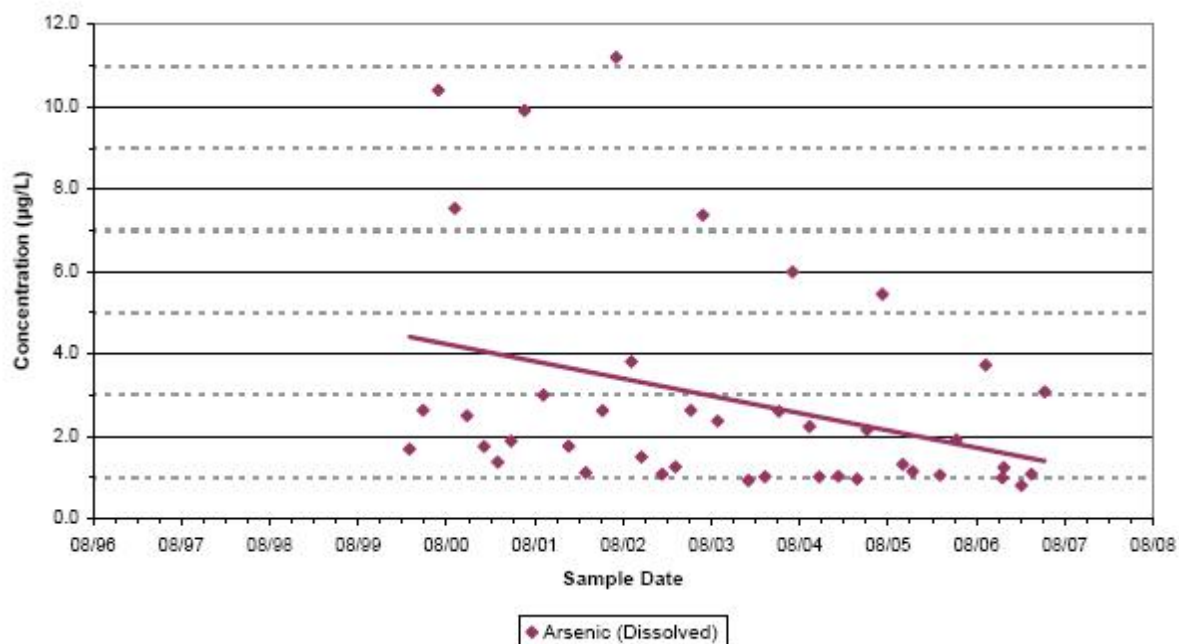


Figure 4-21  
A3 Channel at Terry Street  
Trend for Total Arsenic

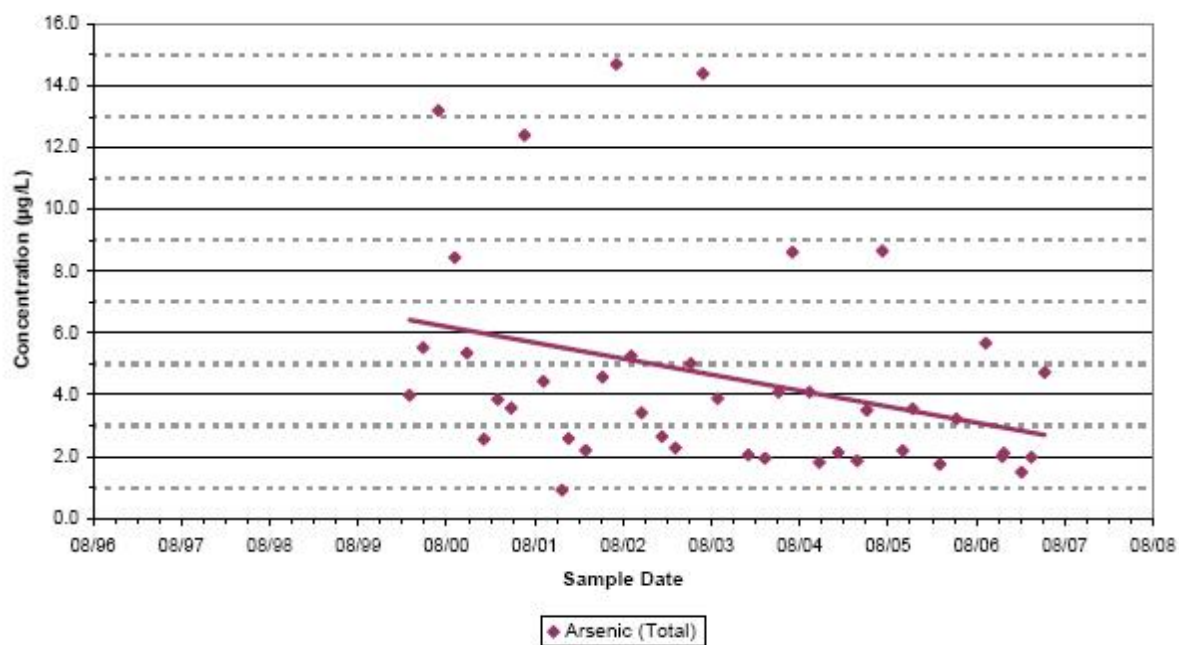




Figure 4-22  
Amazon Creek at Royal Avenue  
Trend for Total Silver

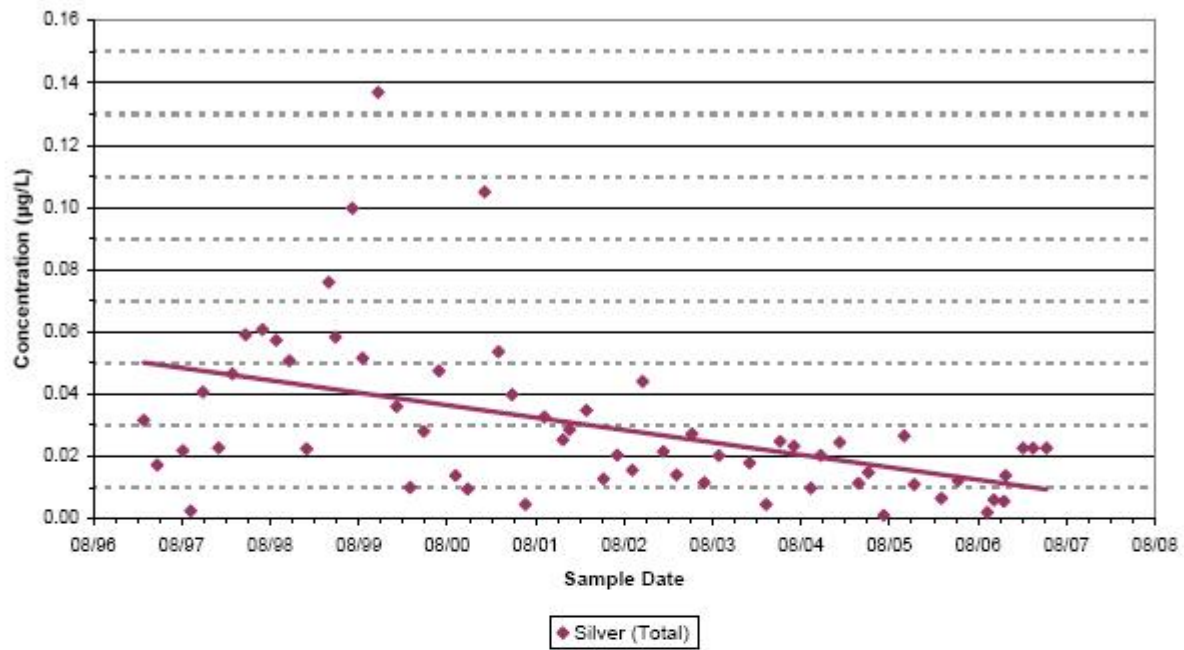


Figure 4-23  
Amazon Creek at Royal Avenue  
Trend for Total Nickel

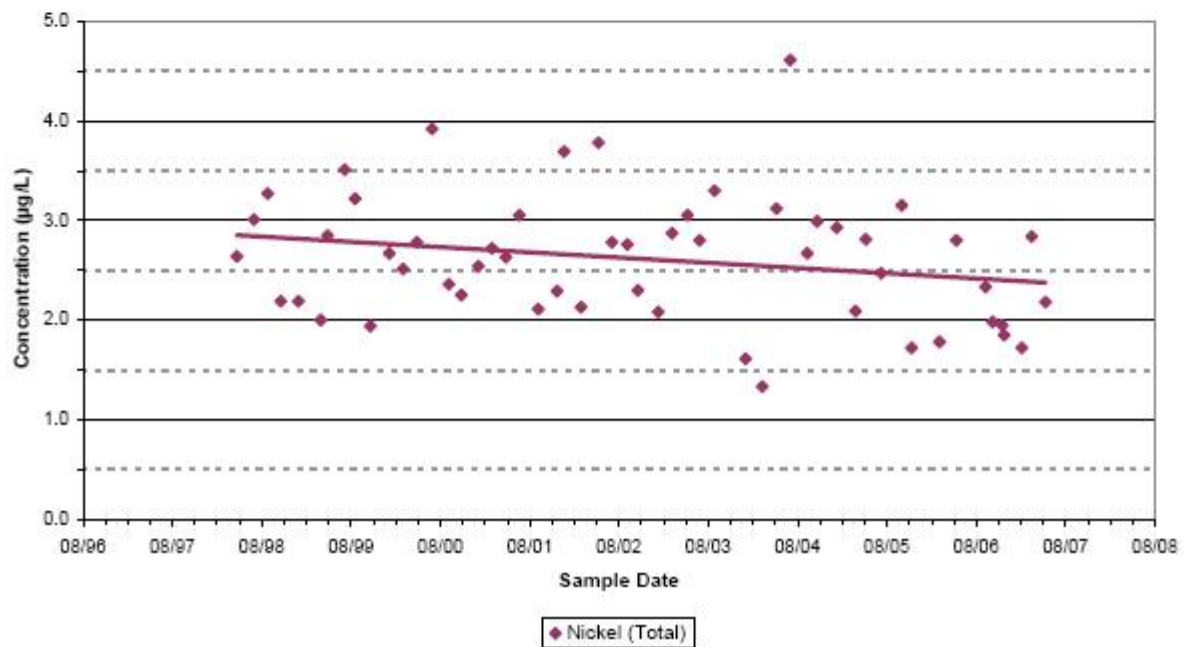


Figure 4-24  
Amazon Creek at Royal Avenue  
Trend for Total Lead

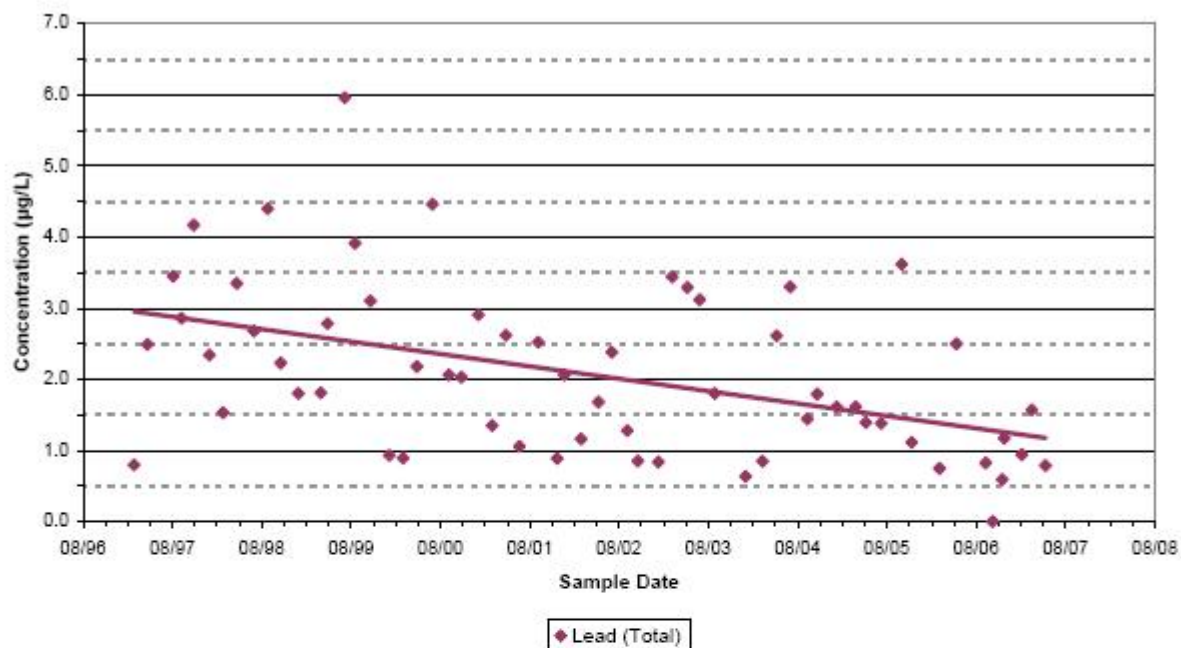


Figure 4-25  
Willamette River at Owosso Bridge (RM 178.6)  
Trend for Field pH

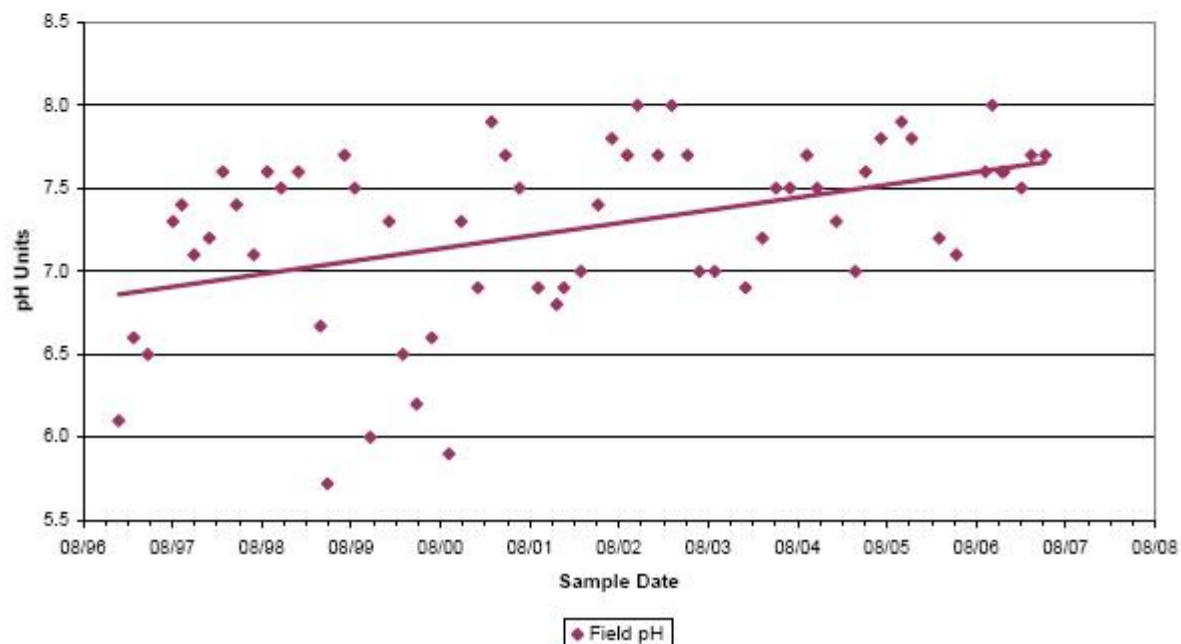


Figure 4-26  
Willamette River Downstream of Beltline Bridge (RM 176.8)  
Trend for Fecal Coliform

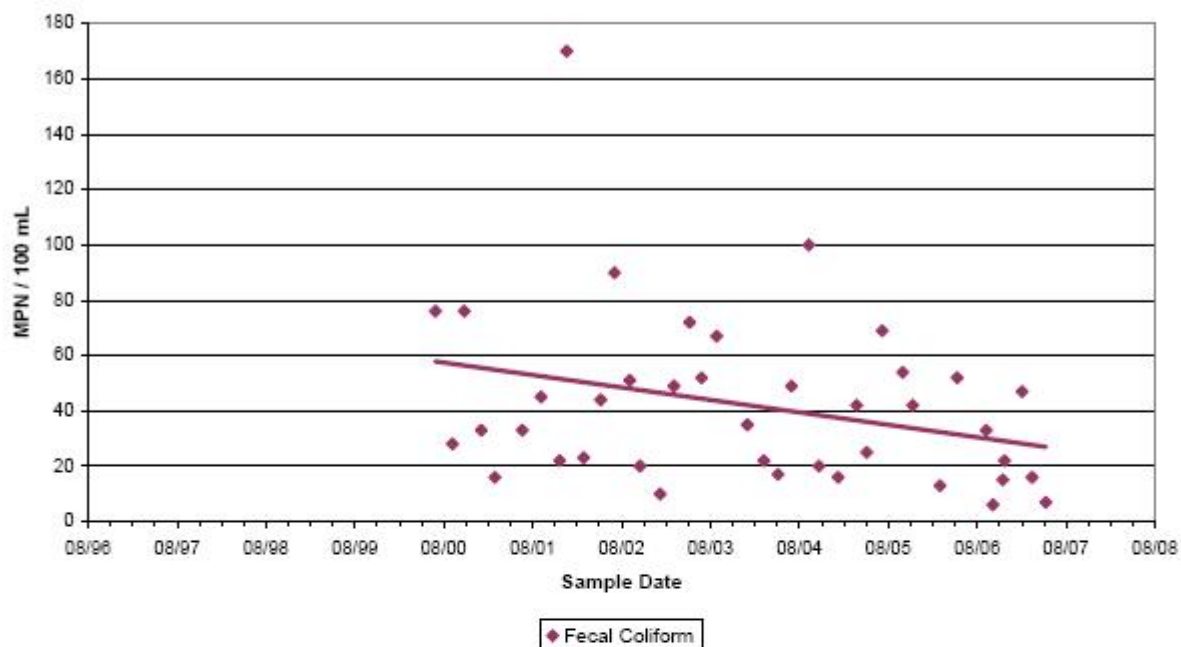


Figure 4-27  
Willamette River Downstream of Beltline Bridge (RM 176.8)  
Trend for Field pH

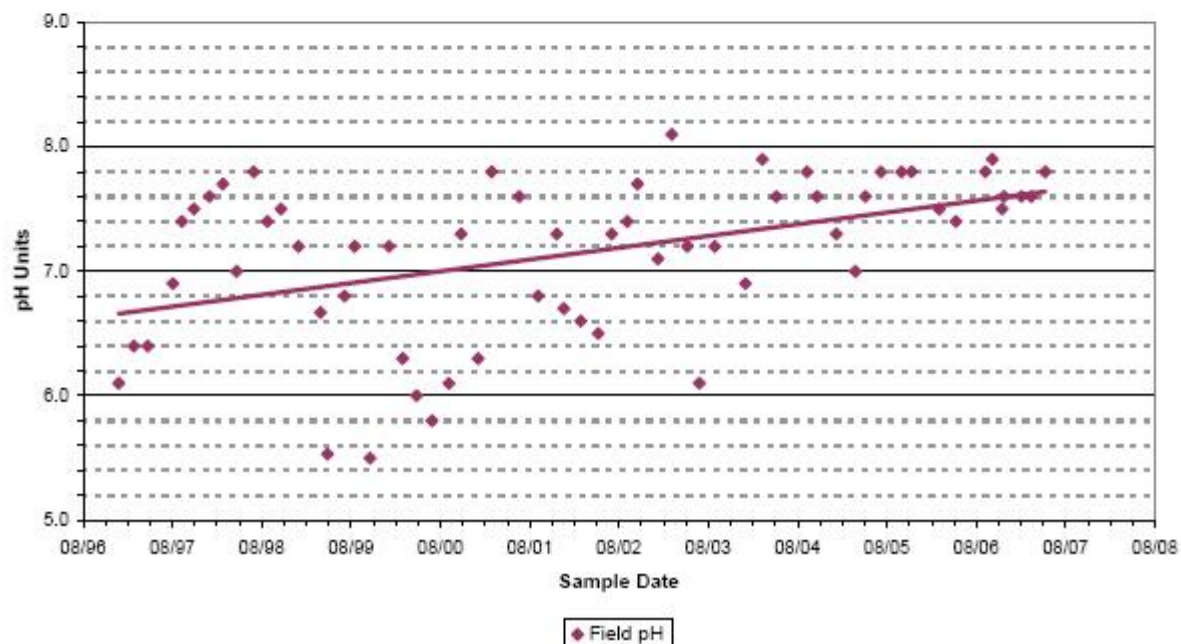


Figure 4-28  
Willamette River Downstream of Beltline Bridge (RM 176.8)  
Trend for Total Suspended Solids

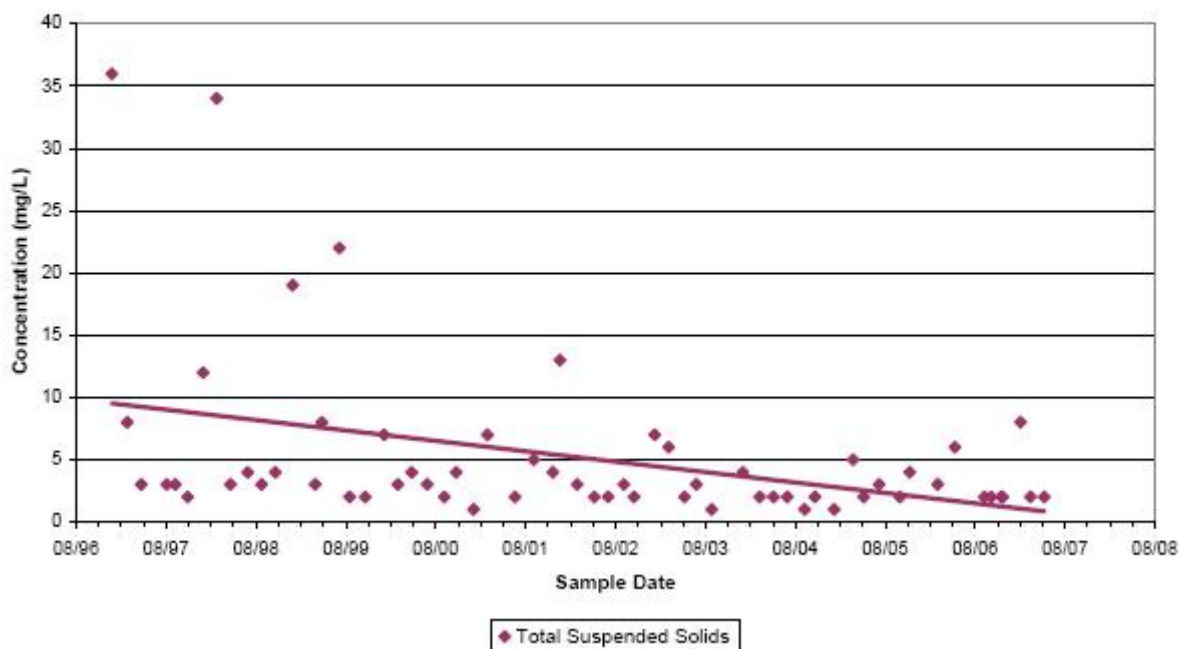


Figure 4-29

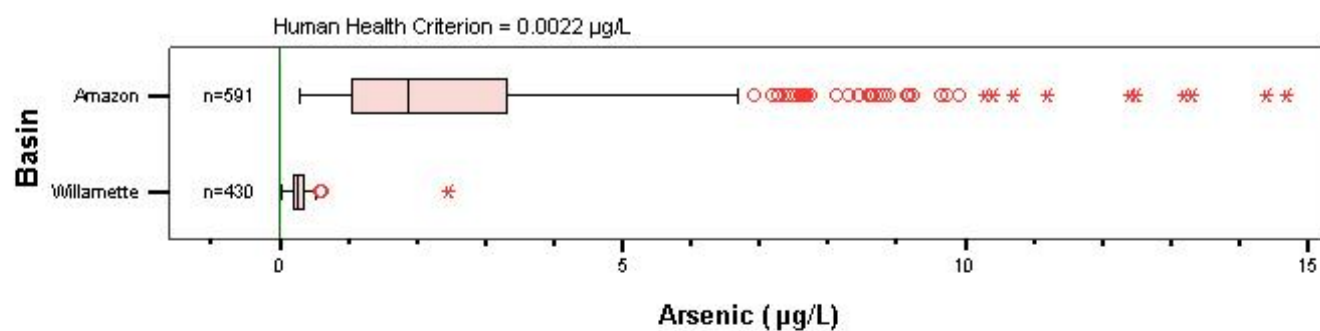


Figure 4-30

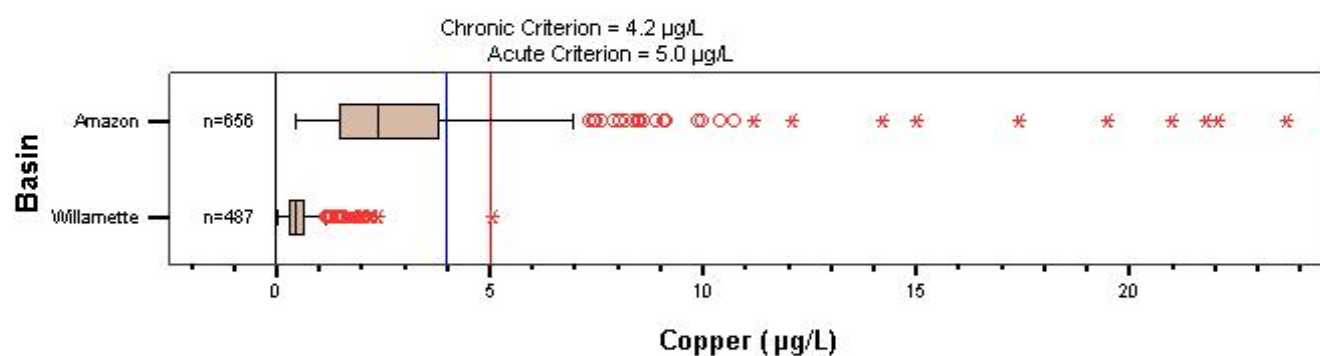


Figure 4-31

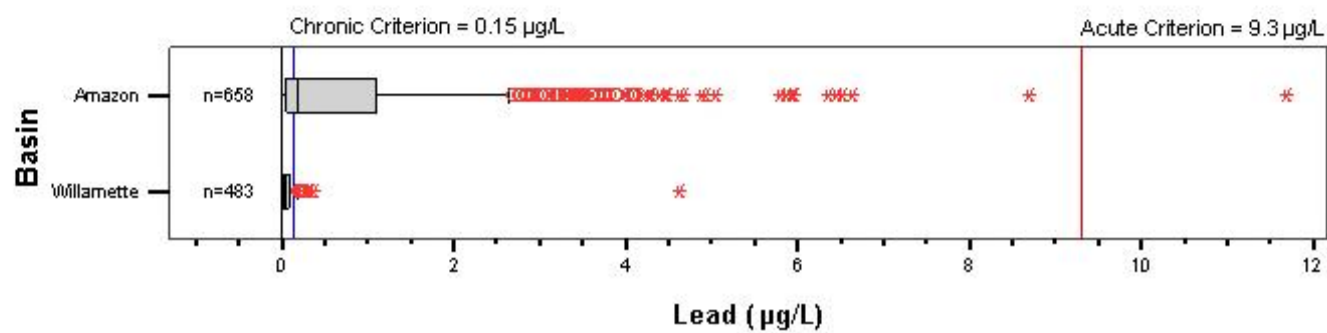


Figure 4-32

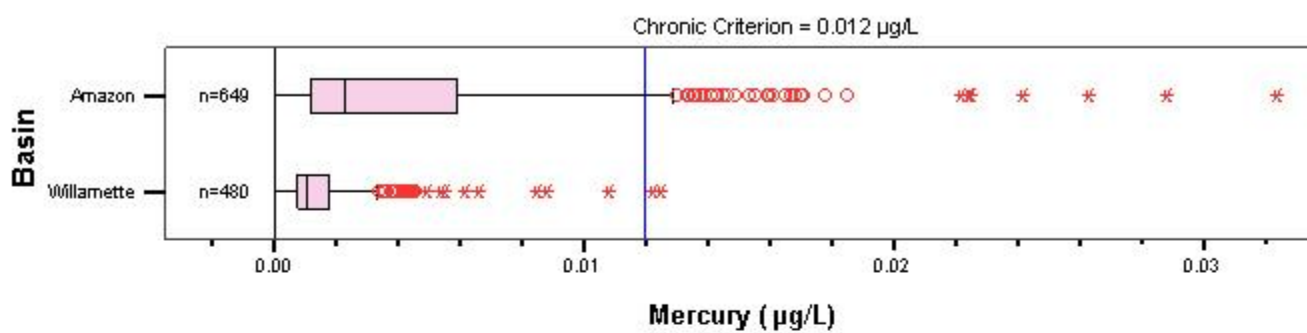
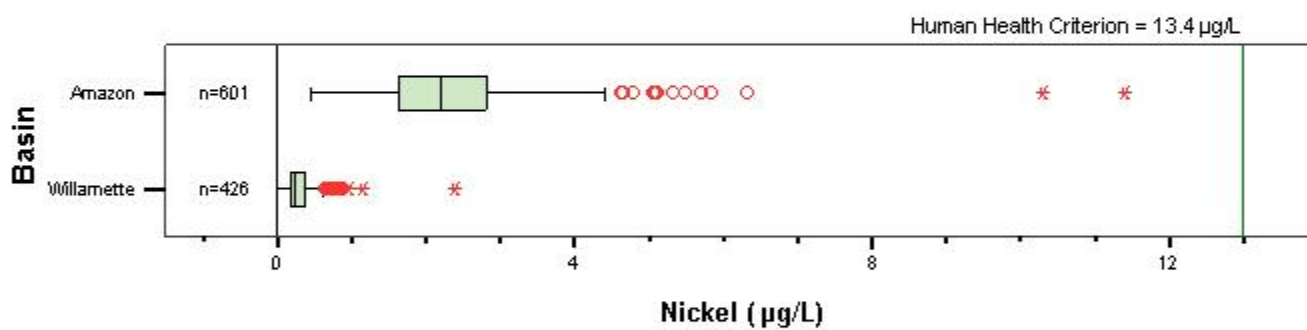


Figure 4-33



**Figure 4-34**

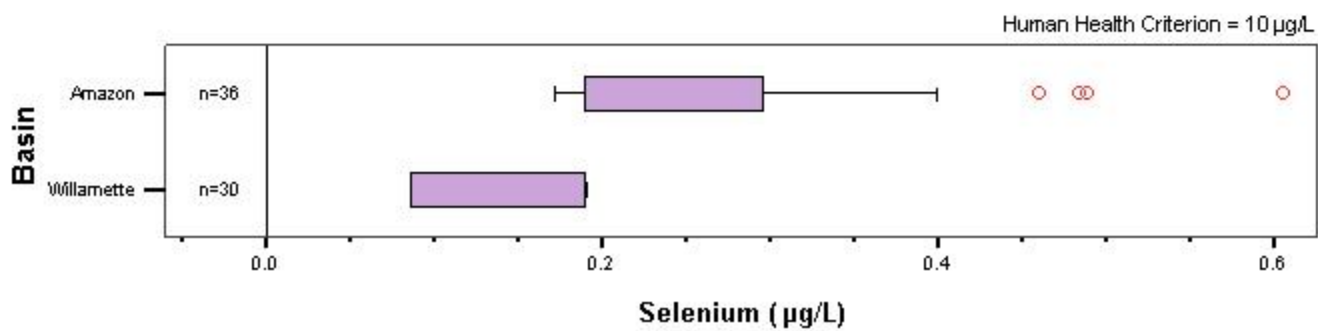


Figure 4-35

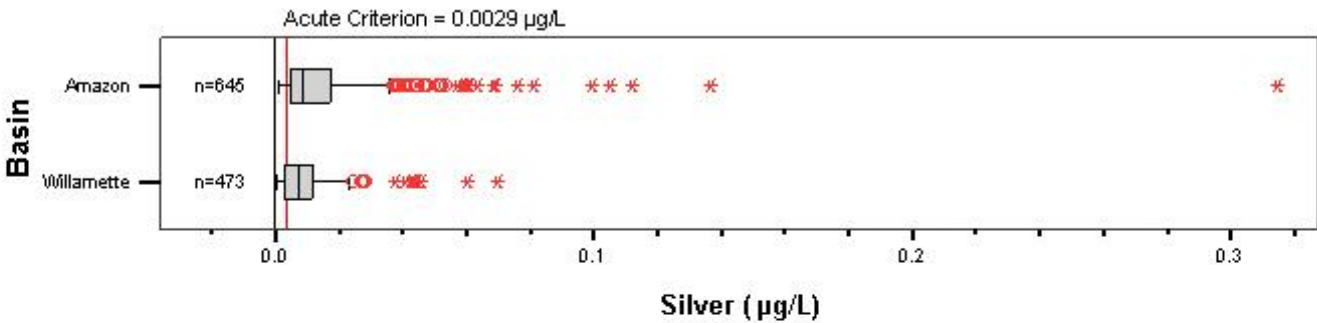


Figure 4-36

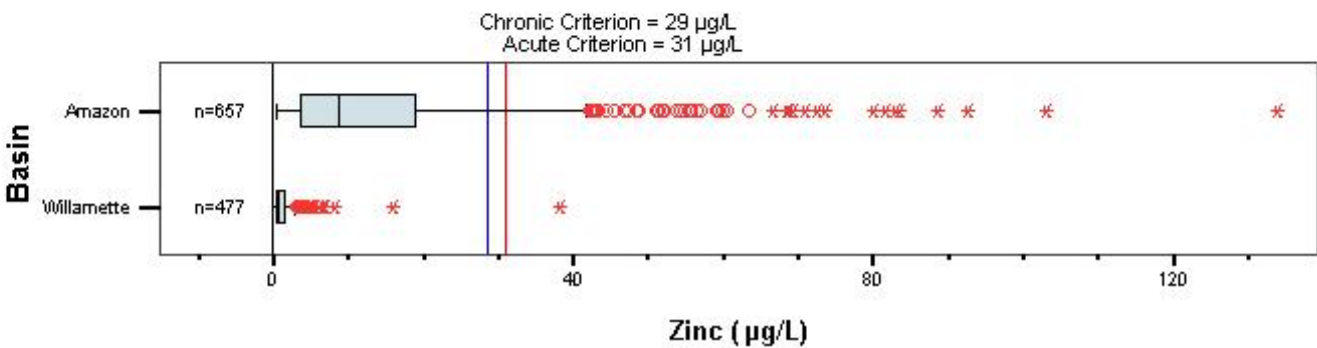


Figure 4-37

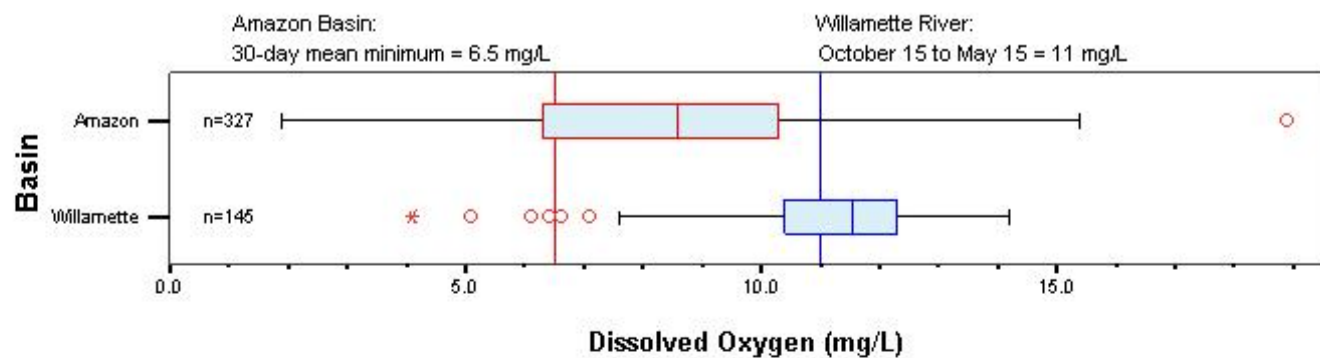


Figure 4-38

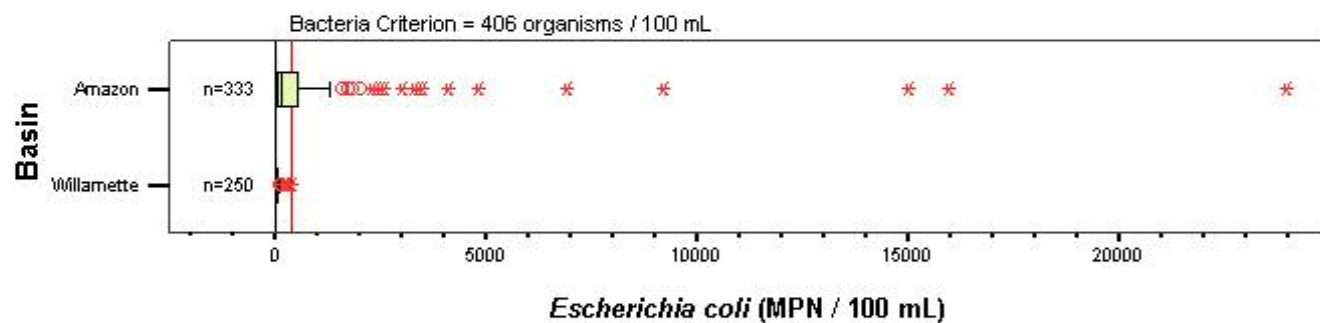


Figure 4-39

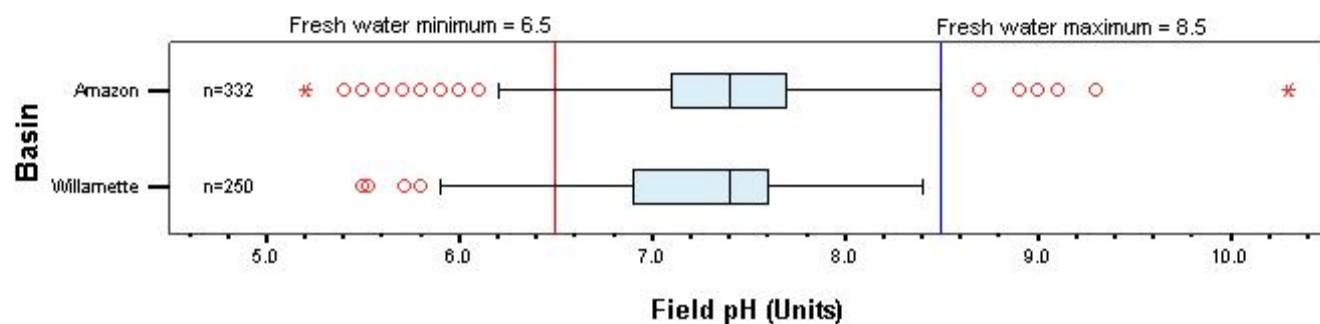




Figure 4-40

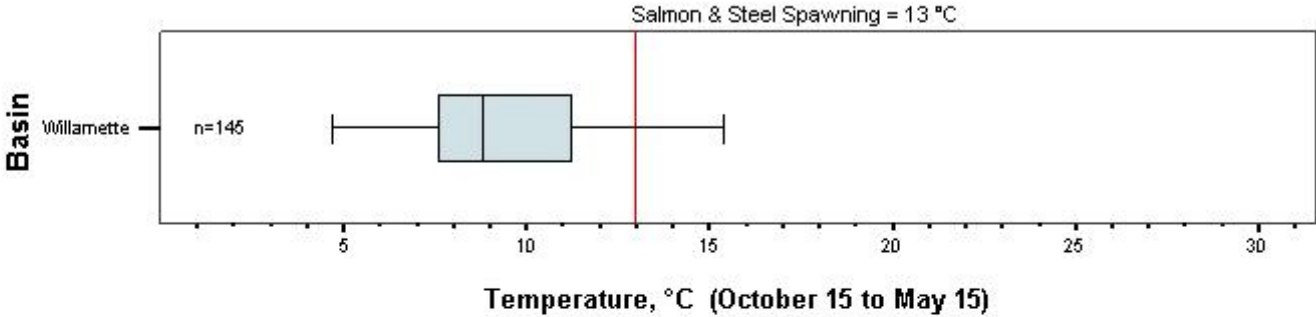


Figure 4-41

